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GEOGRAPHICAL HANDBOOK SERIES

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FRANCE

VOLUME III

ECONOMIC GEOGRAPHY

October 1942

NAVAL INTELLIGENCE DIVISION

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PREFACE

In 1915 a Geographical Section was formed in the Naval Intelligence Division of the Admiralty to write Geographical Handbooks on various parts of the world. The purpose of these handbooks was to supply, by scientific research and skilled arrangement, material for the discussion of naval, military, and political problems, as distinct from the examination of the problems themselves. Many distinguished collaborators assisted in their production, and by the end of 1918 upwards of fifty volumes had been produced in Handbook and Manual form, as well as numerous short-term geographical reports. The demand for these books increased rapidly with each new issue, and they acquired a high reputation for accuracy and impartiality. They are now to be found in Service Establishments and Embassies throughout the world, and in the early years after the last war were much used by the League of Nations.

The old Handbooks have been extensively used in the present war, and experience has disclosed both their value and their limitations. On the one hand they have proved, beyond all question, how greatly the work of the fighting services and of Government Departments is facilitated if countries of strategic or political importance are covered by handbooks which deal, in a convenient and easily digested form, with their geography, ethnology, administration, and resources. On the other hand, it has become apparent that something more is needed to meet present-day requirements. The old series does not cover many of the countries closely affected by the present war (e.g. Germany, France, Poland, Spain, Portugal, to name only a few); its books are somewhat uneven in quality, and they are inadequately equipped with maps, diagrams, and photographic illustrations.

The present series of Handbooks, while owing its inspiration largely to the former series, is in no sense an attempt to revise or re-edit that series. It is an entirely new set of books, produced in the Naval Intelligence Division by trained geographers drawn largely from the Universities, and working at sub-centres established at Oxford and Cambridge, and is printed by the Oxford and Cambridge University Presses. The books follow, in general, a uniform scheme, though minor modifications will be found in particular cases; and they are furnished with numerous maps and illustrations. At the present time books covering over thirty-five countries are in course of preparation, and this list will be substantially extended by the end of 1942.

The purpose of the books is primarily naval. They are designed first to provide, for the use of Commanding Officers, information in a comprehensive and convenient form about countries which they may be called upon to visit, not only in war but in peace-time; secondly, to maintain the high standard of education in the Navy and, by supplying officers with material for lectures to naval personnel ashore and afloat, to ensure for all ranks that visits to a new country shall be both interesting and profitable.

Their contents are, however, by no means confined to matters of purely naval interest. For many purposes (e.g. history, administration, resources, communications, etc.) countries must necessarily be treated as a whole, and no attempt is made to limit their treatment exclusively to coastal zones. It is hoped therefore that the Army, the Royal Air Force, and other Government Departments (many of whom have given great assistance in the production of the series) will find these Handbooks even more valuable than their predecessors proved to be both during and after the war of 1914–18.

This volume has been prepared for the Naval Intelligence Division at the Cambridge sub-centre (Director, Mr J. M. Wordie; General Editor, Dr H. C. Darby). It has been written by Mr S. H. Beaver, Mr G. R. Crone, Dr H. C. Darby, Mr I. L. Foster, Mr F. J. Monkhouse, Mr F. W. Morgan, and Dr Hilda Ormsby. The maps and diagrams have been executed by Miss Margaret Alexander, Mr D. Baldwin, Mr A. O. Cole and Miss K. S. A. Froggatt.

J. H. GODFREY
Director of Naval Intelligence

October 1942

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Chapter I

GROWTH AND DISTRIBUTION OF POPULATION

Introduction: General Features; Occupation Groups

Distribution of Population: Brittany; The Paris Basin; Northern France; Eastern France; West and South-Western France; The Central Massif; The Pyrenees; The Rhône-Saône Valley; The Jura; The Alps; The Mediterranean Coastland

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INTRODUCTION

General Features

The population of France in 1936 was 41,907,000, and the mean density over the whole country 76 per sq. km., or 197 per sq. mile. The following table summarizes the principal features of the population of France and her neighbours:

	Population	Area in sq. km.	Density per sq. km.	No. of cities over 100,000
France (1936)	41,907,000	551,000	76	17
United Kingdom (1937)	47,387,000	244,000	194	57
Germany* (1938)	67,500,000	469,000	144	58
Italy (1939)	44,394,000	310,000	143	23
Belgium (1937)	8,361,000	30,000	278	4

* Territory of 1933.

From *Statistical Yearbook of the League of Nations, 1938–9*, p. 18 (Geneva, 1939).

The density of population in France is clearly a low one compared with that in neighbouring countries. It is due largely to the feeble development of urban centres in comparison with that in Great Britain and Germany. Not merely are there relatively few cities with 100,000 inhabitants, but there are only four of over 250,000, as against sixteen in Great Britain. Great as is the dominance of Paris over other

French cities, it represents a comparatively modest part of the population of the whole country. In Greater Paris live 6,300,000 people, whereas in England and Wales, with a population approximately equal to that of France, Greater London can be regarded as holding over 10,000,000.

In 1936, 21,972,000 people were classified as urban dwellers and 19,935,000 rural, i.e. the urban population was 52 % of the total. In contrast, the urban population in Germany and Austria amounts to 66 % of the total, and in Great Britain to 80 %. But low as is the French figure, it exaggerates the proportion of the population classed as urban, for the classification includes as urban any commune in which the agglomerated or grouped population reaches 2,000, and thus all the little market centres of the countryside and even many large villages are counted as urban.

The fact that Italy, a country which is urbanized to only a moderate degree, has a mean density of population almost double that of France suggests that the French rural population is not a dense one for western Europe. The density of population in her most populous countrysides is considerably below the corresponding figures for neighbouring countries, for there is, by comparison, a smaller farming population actually employed upon agricultural land. In 1931, for example, in rural France 7,704,000 persons were working in agriculture upon 347,040 sq. km. of land used for agricultural purposes (i.e. cultivated land, meadow, and pasture), a density of 22 persons occupied per sq. km. The corresponding figure for Italy was 41, for Germany 32·5, and for Belgium 33. It must be remembered that figures of agricultural density for the whole country conceal the fact that an appreciable section of the French agricultural population is engaged in vine-growing, which is intensive, apart from that section employed in growing fruit and market-garden produce, so that the remaining rural population is inevitably thin.

Occupation Groups

The latest year for which detailed returns of the numbers employed in different occupations is available is 1931, when the total occupied population amounted to 21·6 millions, out of a population of 41·2 millions. The number was, broadly speaking, equally divided between three main categories: (1) agriculture together with forestry and fishing; (2) mining and manufacturing; (3) the distributive and other occupations. This fact illustrates clearly enough the balanced nature of the French economy.

Numbers employed, by category of industry

1931 (in thousands)

	Total		Men	Women	Group total
	Number	%			
Fishing	66·7	0·3	63·4	3·3	7,704·1
Forestry	58·4	0·2	54·7	3·7	
Agriculture	7,579·0	35·6	4,392·4	3,186·6	
Mining and quarrying	440·7	2·0	429·3	11·4	6,402·3
Manufacturing	5,951·6	27·5	3,850·8	2,100·8	
Building	886·1	4·1	874·4	11·7	7,515·4
Transport	1,069·3	4·9	934·7	134·6	
Commerce:					
Wholesale and retail trade, banking, etc. Entertainment	2,695·4	12·4	1,538·2	1,157·2	
Professions	657·8	3·0	332·6	325·1	
Domestic and personal service	893·4	4·1	176·6	716·8	
Public services	1,313·4	6·0	1,064·4	249·0	
Total	21,611·8		13,711·5	7,900·2	

From *Annuaire Statistique, 1938*, pp. 104–5 (Paris, 1939).

Detailed comparisons with other countries are not easily made owing to differences in the methods of classifying various occupations. Certain broad differences between France and England and Wales stand out, however. In 1931, although the population of France was greater by only 1·9 millions, the occupied population was greater by 2·8 millions, mainly owing to the large number of women employed in French agriculture. The most striking difference lay in the numbers engaged in agriculture, which were greater in France by 6·5 millions. In mining and manufactures the numbers in England and Wales exceeded those in France by nearly 2 millions: mining and quarrying by 0·5 million, and manufactures by 1·5 millions.

Of the distributive and other occupations, the numbers engaged in England and Wales are greater by about 1·7 millions. In the two countries the numbers engaged in building and in the professions differ very little; in England the numbers engaged in transport are greater, and in trade and commerce considerably greater. The chief difference between the two countries, however, lies in the remaining categories. In England the number of people engaged in domestic and personal service is more than twice the number so engaged in France; the number of employees in public services, in France, on the other hand, is much greater than in England. Such comparisons must not be pushed too far, however, owing to differences in methods of categorization between the census returns of the two countries.

In France, as elsewhere, occupational groupings are subject to change. For a variety of reasons, the census of 1906 offers the most convenient comparison with the census of 1931. In the quarter of a century between the two censuses the numbers of the occupied population increased by 661,000, an increase almost entirely confined to men. This figure, however, conceals very great changes in detail, which have modified the economy of France in no small degree. Agriculture lost 1,350,000 in the numbers employed, the manufacture of clothing 550,000, and domestic and personal service over 100,000. The greatest gains were registered in the metal industries—782,000; most industries, however, and all the service occupations, increased their labour forces. Most of these changes reflect such widespread tendencies as the movement from the land, and the expansion of the motor and electrical industries.

Changes in Occupation Groups, 1906–31

(in thousands)

	Total	Men	Women
Decrease:			
Agriculture	1,335	1,001	334
Manufacture of clothing	550	10	540
Manufacture of straw, leather and wood	91	140	49(+)
Domestic service	152	64	88
Increase:			
Mining and quarrying	160	154	6
Manufactures:			
Foodstuffs	65	0	65
Chemicals	110	72	38
Paper and rubber	84	50	34
Printing	47	26	21
Textiles	6	(-)33	39
Metallurgy	103	97	6
Metal working and engineering	678	562	116
Building	336	326	10
Transport	183	289	(-)106
Commerce:			
Wholesale and retail trade	435	175	260
Banking, assurance	204	115	89
Professions	174	42	132
Public services	275	144	131
Personal service	33	10	23

From P. Depoid, 'Structure Professionnelle', *Revue d'Economie Politique*, LVIII, 51 (Paris, 1939).

DISTRIBUTION OF POPULATION

Several main features emerge from a study of the map of population distribution. (1) A number of thinly populated areas stand out, of which four are clearly to be expected—the Alps, the forested Landes, the narrow belt of the high Pyrenees, and the southern parts of the Central Massif. Population here is below 20 to the sq. km., and comparable to that of Dartmoor or the Welsh mountains. Other regions of low density, however, are all distant from high mountains and fairly near Paris, appearing in some measure to insulate it from the east, south and west. One lies between Paris and Bourges; another, the smallest, lies west of Paris; the third, and largest, consists of the Champagne region and is roughly half-way to the eastern frontier, suggesting a considerable separation between the capital and the eastern regions prior to the development of rapid transport, and forming an interesting commentary on the evolution of the French state. It is a situation entirely different from that existing for centuries in the well-peopled English plain. (2) There is a broad belt of population with a density of 20–60 per sq. km., which extends, without any substantial interruption, from Normandy almost to the Pyrenees.

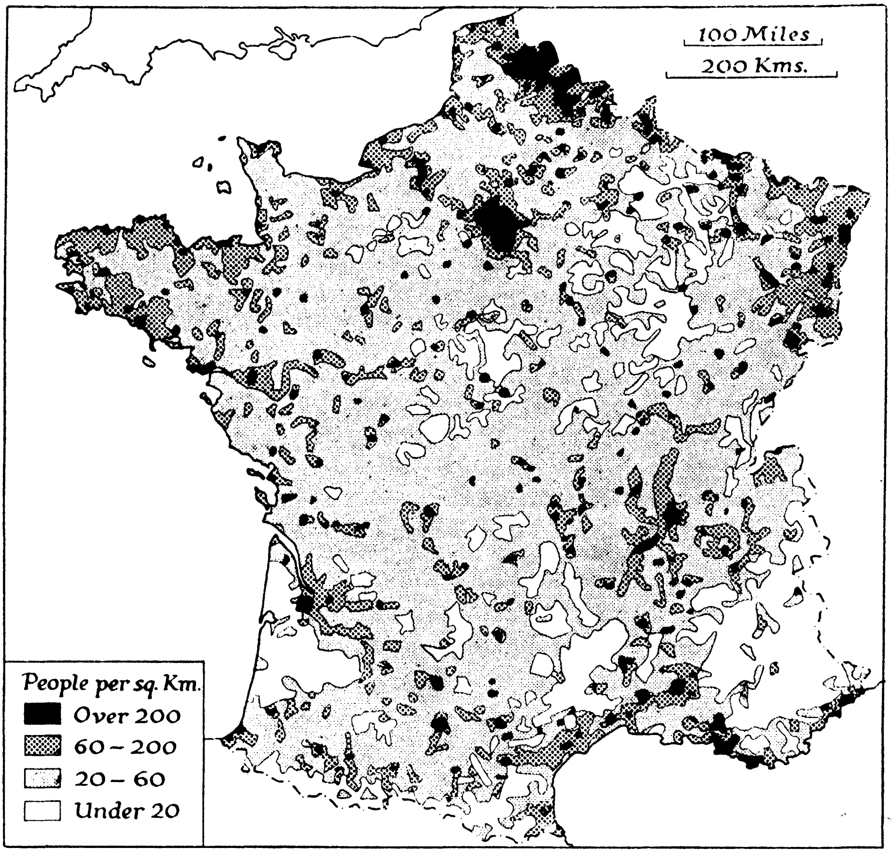


Fig. 1. The distribution of population, 1931

Based on the *Atlas de France*, Plates 72–75 (Paris, n.d.).

This is a purely rural population, comparable in density to that found in the central and western parts of Devonshire. Only three regions possess any dense rural populations on a considerable scale—the plain of Alsace, Brittany, and the wine district of Languedoc; smaller and often discontinuous areas are found along the lower valleys of the Rhône, Garonne, and Loire. (3) There are few areas of dense urban agglomerations and associated semi-urban populations which are so common in England; only two stand out—the Paris region and the northern coalfield. The others are smaller, like those of the ports, or else composite and spread over some distance, like the Lorraine industrial centres, the cities of Alsace or the Lyons-St Etienne group. A prominent feature of these densely peopled areas is their location on or near the land or sea frontiers, especially the eastern frontier.

In the following detailed account the regions described are, broadly speaking, those which appear in the physical description, vol. I of this Handbook (pp. 6–7). It is impossible, however, to keep entirely to the physical regions.

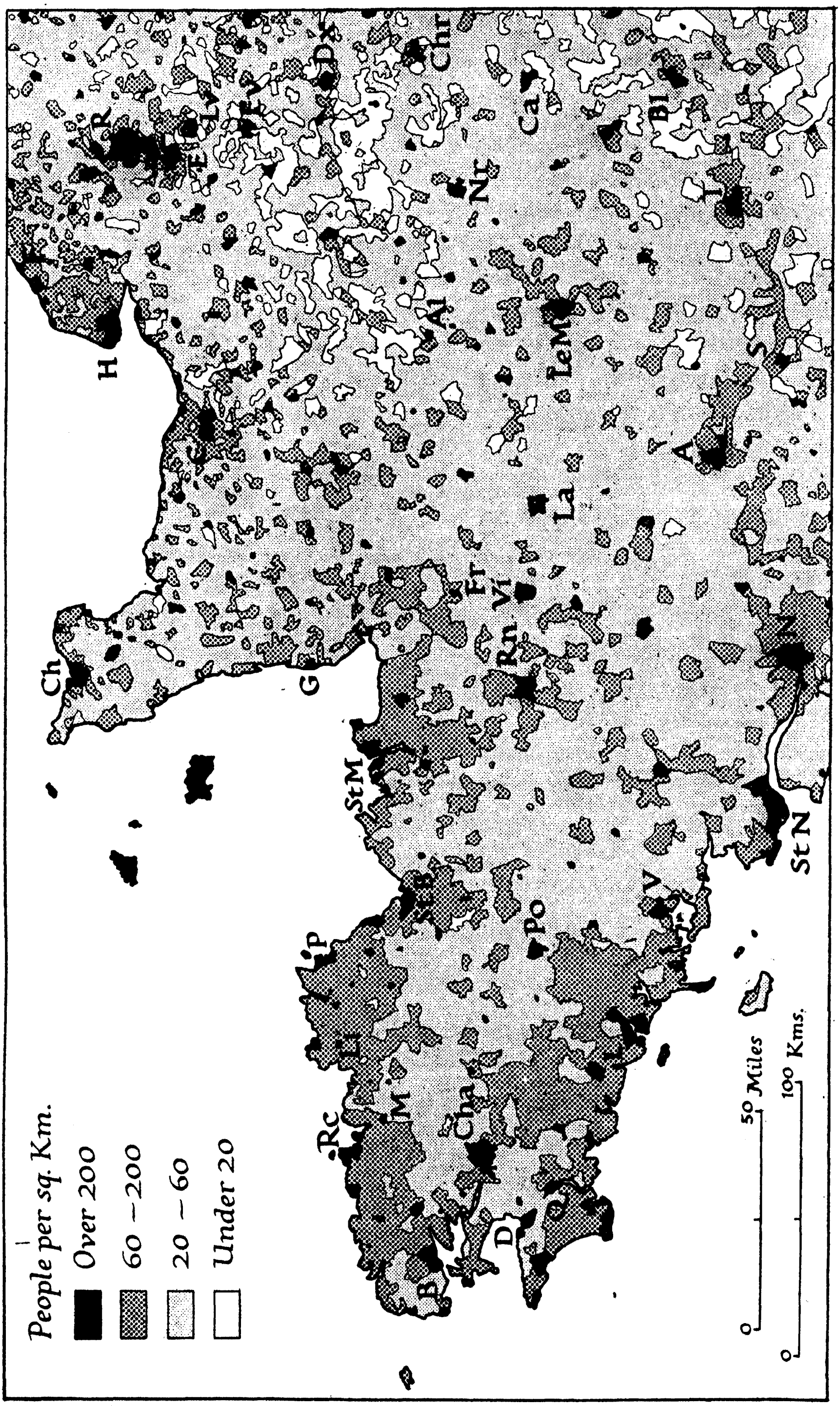
(1) *Brittany* (Fig. 2)

A prominent and well-known feature of the distribution of population in Brittany is the relative concentration in the coastal zone, or the 'Armor'. This concentration is not a regular belt of dense population but rather a series of small hinterlands extending around each of the many Breton ports. The interior, or 'Arcoet', is only moderately peopled, and possesses only three towns of any size—Rennes (98,000), the university centre and former capital of Brittany, Fougères (20,000), towards the east, and Pontivy (6,000), to the west.

Generally speaking, the soils of the coastal regions are not more fertile than those of the interior; proximity to the sea coast, however, has enabled the cultivators from time immemorial to utilize shelly sands to lighten the clays and seaweed to dress the sandy soils. The improved agriculture possible is reflected in the greater amount of wheat grown in these regions compared with the buckwheat of the interior. During the last century or so these agricultural possibilities have been extended, for with the demand for market-garden produce, both in England and in France, the mild climate and sheltered aspect of many of these little coastal areas have been utilized in the development of a considerable market-gardening industry. The many small ports which serve this industry themselves provide a market, as do the larger ports of Brest and Lorient.

This coastal zone also derives some of its attraction from the proximity of the sea itself, although this factor has frequently been over-emphasized. Fishermen proper are comparatively rare, being found mostly at St Malo and Paimpol on the north coast and at Ile de Groix and Lorient on the south. Elsewhere, fishing is usually the part-time occupation of a man who has a little land or some other means of livelihood on shore, and the proportion of time spent on fishing as against farming varies considerably. Subsidiary industries such as fish canning offer other means of livelihood in several of the small towns; the pensions received by the male population liable to the *circonscription maritime* and the tourist traffic provide yet other sources of income. This dense population has given rise to the traditional notion of the coastal zone being a *ceinture dorée* or 'golden girdle' around the peninsula. The concentration of population is undeniable, but it is wrong to assume that this means also a concentration of wealth. In some of the most productive agricultural areas, like those around Roscoff and Plougastel, there is often an intense subdivision of the available land which means a small share of the returns for many individuals. And, further, between some of these richer districts along the coast lie others which are less rich than the interior where, in a number of areas, improved methods of stock raising and cider-apple production have transformed the standard of living. The greater density of population in Armor is due to a higher birth-rate and not to any attraction of an Eldorado, for emigration from the interior is not to Armor but elsewhere. Subsidiary industries may have exploited cheap labour in the past rather than have brought wealth, for at the beginning of this century several investigators commented on the extreme poverty of workers in the sardine-packing factories. Further, the high value of land in the Armor is due partly to the competition for its possession among an overcrowded farming population.

The interior of Brittany is very different, with a rural population of 40–60 per sq. km. against 150–200 in Armor. The density here is low only in comparison with the coast, for the same figure applies to the greater part of rural France. The population has lived for centuries by means of low-grade tillage, which in the last generation has seen much conversion to fodder production for cattle rearing. This is the region which provides the many Breton emigrants who have gone to neighbouring towns like Rennes, Nantes and Angers, to Paris, and recently to rural areas. The interior of Brittany is the *bocage* countryside *par excellence*, with enclosed fields everywhere except on the unreclaimed *landes*, with settlement widely spread about a multi-


People per sq. Km.
Over 200
60 – 200
20 – 60
Under 20
0
50 Miles
0
100 Kms.
Ch
G
H
R
LV
Dx
Chr
Ca
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Al
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Fig. 2

plicity of roads; with farms and hamlets on the sides of ridges, below windswept hill tops and above damp valley bottoms.

Most of the towns of the peninsula lie on or near the coast. On the south coast the largest are Vannes (24,000), the naval base of Lorient (46,000), Quimper (19,000) and Douarnenez (10,000). In the extreme west, Brest (79,000) and the two adjoining towns of Lambézellec (19,000) and St Pierre Quilbignon (14,000) form a considerable centre of population. Along the north coast are Morlaix (14,000), St Brieuc (31,000), and St Malo-St Servan (26,000), with Dinan (12,000) a short distance inland.

The same moderate and widely spread population continues eastwards through the border department of Ille-et-Vilaine into the region of Maine and southern Normandy. The most easterly part of the Armorican plateau carries a thinner population where the forests of the 'march', like Marchenoir, formerly stood. In the centre of Maine around Le Mans is some concentration of settlement, as again on the warmer calcareous soils in the south towards Touraine, in the valley of the Loir (a tributary of the Loire). To the north, on the borders of Normandy, is the most extensive area of low density to be found anywhere in north-western France, in the broken country of the Hills of Normandy and of Perche, and indeed this density does not increase very much to within a short distance of Paris itself. Western Normandy, in the Bocage Normand and in Cotentin, seems to be, in density of population, an extension of the Breton Arcoet, but the west coast of the peninsula is no counterpart to the *ceinture dorée*, and there is only one port, Granville (10,000). The modern port of Cherbourg (39,000) lies at the extremity of the Cotentin peninsula, and has not developed any fringe of population around itself. The largest town in western Normandy is Caen (61,000), which is the centre of a well-populated district of villages on the limestone soils of the area; nearby are St Lô (12,000) and Lisieux (16,000). Southwards towards the Loire, in Maine, lie Le Mans (84,000), the important military centre, and Laval (28,000).

Fig. 2. The distribution of population in north-western France, 1931

Based on the *Atlas de France*, Plate 72 (Paris, n.d.).

This map, like Figs. 3, 4, 5, 6, 7, 8, and 9, is constructed on the basis of communes. A, Angers; Al, Alençon; B, Brest; Bl, Blois; C, Caen; Ca, Châteaudun; Ch, Cherbourg; Cha, Châteaulin; Chr, Chartres; D, Douarnenez; Dx, Dreux; E, Elbeuf; Ev, Evreux; F, Fécamp; Fr, Fougères; G, Granville; H, Havre; Li, Lannion; La, Laval; L, Lorient; Lv, Louviers; LeM, Le Mans; M, Morlaix; N, Nantes; Nr, Nogent-le-Rotrou; P, Paimpol; Po, Pontivy; Q, Quimper; Rn, Rennes; R, Rouen; Rc, Roscoff; S, Saumur; StB, St Brieuc; StM, St Malo; StN, St Nazaire; T, Tours; V, Vannes; Vi, Vitré.

(2) *The Paris Basin* (Fig. 3)

Like Picardy which it adjoins, eastern Normandy, in the Pays de Caux and Pays de Bray, supports an active and numerous agricultural population, in a variety of village and hamlet types, but Fig. 3 clearly shows the effects of urban settlement. Around Havre (164,000, agglomeration 190,000) lie several subsidiary towns; garden cities are becoming important along the Seine, upstream and around the mouth, with such activities as decentralized engineering industries and petroleum refining, e.g. Port Jérôme. On a very small scale, a similar development is taking place near Dieppe (Dieppe-Neuville, 29,000), where the little town of Arques has industries such as rayon manufacture; its population of only 2,500 is an indication of the decentralized nature of the factory village that is appearing in the Seine-Inférieure Département. Rouen lies in an irregular grouping of urban settlements: the city itself has 123,000 inhabitants, Sotteville the bridgehead town has 27,000, but the population of the agglomeration of these two, together with contiguous towns, is 240,000. The straggling town life of the area is a very old survival and is largely a reflexion of the long-established Norman textile industry; nearby is another centre, Elbeuf (17,000, or 35,000 with adjoining districts). To the south, in the valley of the Iton, lie Louviers (10,000) and Evreux (20,000).

In the centre of the Paris Basin lies the great concentration of population in and around the capital (see also pp. 82–101). The city itself, together with the adjoining suburbs, make up the department of the Seine. This area represents present-day Paris and holds a population of 4,963,000. Outside the Seine department lie adjoining towns, like Rueil Malmaison and Aulnay-sous-Bois, which make up Greater Paris, while farther out are many more residential and manufacturing towns which are satellites of the capital, like Argenteuil and Versailles. The department of Seine-et-Oise, which completely surrounds the Seine department, contains the greater part of this population. In 1936, with 1,413,000 inhabitants, it was the third most populous department in France, being exceeded only by the Seine and the Nord. Seine-et-Marne, the department lying to the east, with 409,000 inhabitants, contains most of the remaining satellite population. A small overflow extends northwards into the southern part of the Oise department, chiefly around the important railway centre of Creil (11,000).

The entire area of urban and semi-urban population, made up by

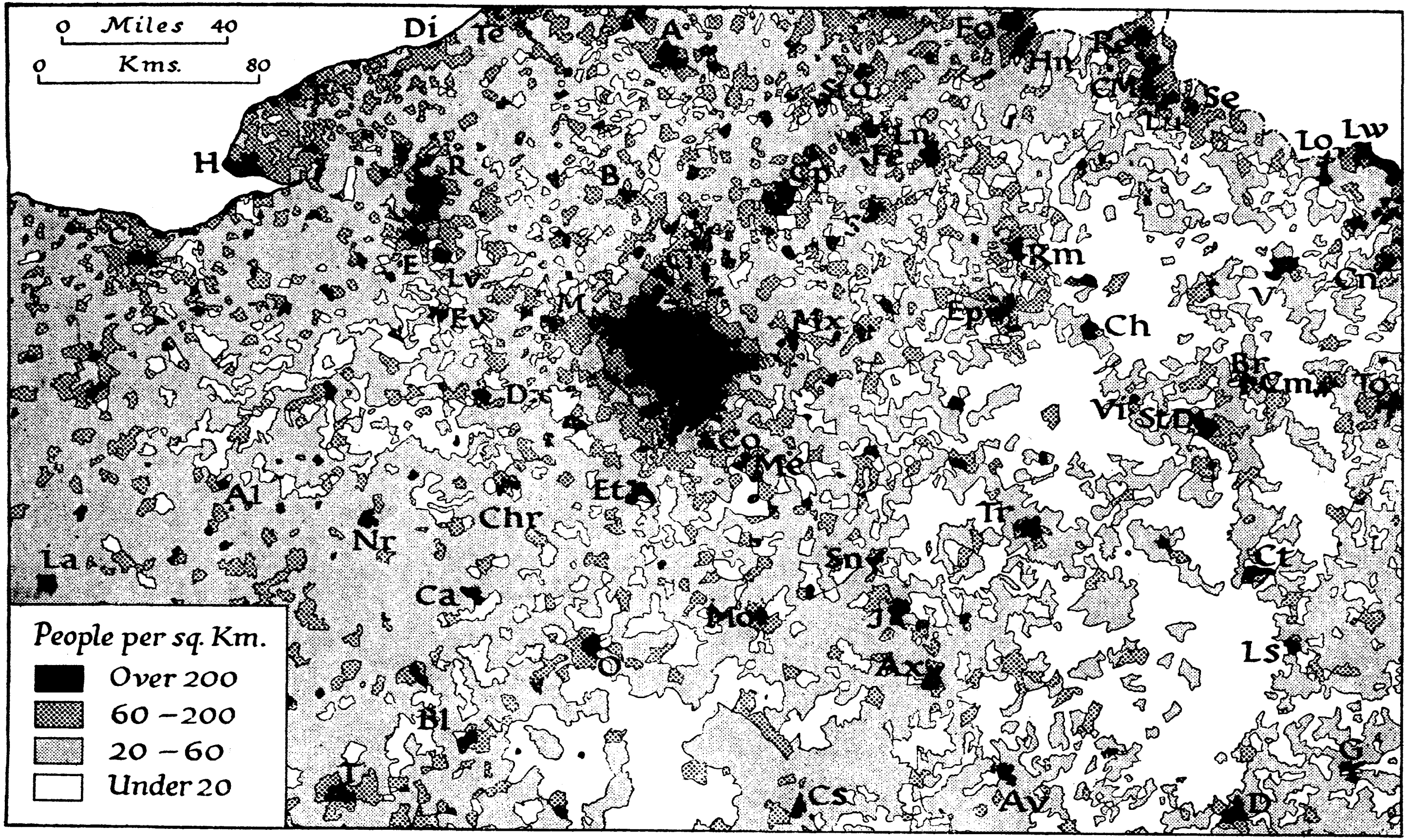
Paris itself, the suburbs and the satellites, may be described as a quadrilateral extending over about 100 km. from Mantes in the west to Meaux in the east, and over the same distance from Creil in the north to Etampes in the south. Beyond these extreme limits, however, population rapidly diminishes to rural densities, and in the east of the Seine-et-Marne department is very thin. Outer suburban railway services reach farther to the east and south as far as Château Thierry and Montargis (14,000), and are responsible for outlying groups of denser population. In recent years, too, the main roads have allowed the growth of radiating lines of newer settlements.

The departments of Seine-et-Oise and Seine-et-Marne contain forty-two administrative towns of over 10,000 inhabitants. Some of these are spreading residential areas with little individuality, others are old towns and villages which have received a new access of population through the growth of the capital. None reaches any great size, for the largest is Versailles (74,000), and the majority do not exceed 15,000.

The distribution of these satellite towns is most uneven; nearly all lie to the east or west, few to the north or south. Immediately to the east of Paris lie nine towns, mainly residential, of which the largest is Aulnay-sous-Bois (32,000). To the south, some distance up the Seine, five towns lie near each other, of which the largest is Villeneuve-St Georges (21,000). Engineering and metal industries have developed here considerably in recent years. To the west, however, lies the principal group of satellite towns, numbering twenty-one. The largest are Versailles (74,000) and Argenteuil (59,000), while Maisons-Lafitte (13,000) and Sartrouville (17,000), lying on opposite sides of a road and rail crossing of the Seine, form the third largest centre of population. Following the expansion of motor, aircraft and other industries in recent decades, a number of former villages have expanded to the size of small towns. These satellites on the western side of Paris lie mainly in two groups—within the bend of the Seine below Argenteuil, and between Versailles and the capital.

The population of these departments may be analysed as follows:

	Population in thousands			Towns			
	Total	Rural	Urban	10–15,000	15–25,000	25–50,000	Over 50,000
Seine-et-Oise	1,413	345	1,068	25	9	2	2
Seine-et-Marne	409	255	154	2	2	—	—


0 Miles 40
0 Kms. 80
Di
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Rm
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Ca
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Mo
J
Ls
O
Ax
Bl
T
Cs
Av
D
G
People per sq. Km.
Over 200
60 – 200
20 – 60
Under 20

Fig. 3

Beyond the Paris region rural France is soon reached. To the west, in the countrysides of Hurepoix and the Thimerais, there is a thinning out of the density; a belt of more active agriculture reaches towards the Loire through the cathedral city of Chartres (27,000) and Châteaudun (6,000). South of Paris lie the extensive and famous wheatlands of Beauce, but farming is not very intensive and the moderate population is found in villages or large farms usually near a well or other water supply. At the elbow of the Loire stands Orléans (73,000). The rich alluvial margins and terraces introduce a belt of dense agricultural settlement, based largely on viticulture. This strip forms a sharp contrast to the considerable forest in the sands immediately north of Orléans and to the extensive forest region of the Sologne to the south, where population is very thin on the lake-studded clay. Eastwards, on either side of the Yonne, is the irregularly spaced and less numerous population of the Senonais, Gâtinais and Pays d'Othe. The chief towns are Sens (18,000) and Montargis (14,000).

East and north-east of Paris, on the Tertiary plateaux of Brie, Valois and Soissonais, lies a semicircle of active agricultural population, grouped largely in villages though with many scattered farms, especially in Brie, where they form a distinct landscape; the distribution is irregular owing to the diversified background of loam-covered plateau and river valley. Here in the northern apex of these plateaux is an area for long one of the most wealthy in France, around Noyon, Laon (20,000), Reims and Soissons (20,000), where the varied outcrops of sands and limestones and the limon cappings have long provided fertile arable land, as well as timber and building stone. In the easterly extension of these plateaux an outstanding thickening of population is seen in the Champagne wine district, where many

Fig. 3. The distribution of population in the Paris Basin, 1931

Based on the *Atlas de France*, Plate 73 (Paris, n.d.).

A, Amiens; Al, Alençon; Av, Avallon; Ax, Auxerre; B, Beauvais; Bl, Blois; Br, Bar-le-Duc; C, Caen; Ca, Châteaudun; Ch, Châlons-sur-Marne; Cm, Commercy; Cn, Conflans; Co, Corbeil; Cp, Compiègne; Cr, Creil; Cs, Cosne; Ct, Chaumont; Chr, Chartres; CM, Charleville-Mézières; Dx, Dreux; Di, Dieppe; D, Dijon; E, Elbeuf; Ep, Epernay; Et, Etampes; Ev, Evreux; F, Fécamp; Fe, La Fère; Fo, Fourmies; G, Gray; Hn, Hirson; J, Joigny; Lu, Lumes; La, Laval; Ln, Laon; Ls, Langres; Lo, Longuyon; Lv, Louviers; Lw, Longwy; H, Havre; M, Mantes; Me, Melun; Mo, Montargis; Mx, Meaux; Nr, Nogent-le-Rotrou; O, Orléans; Re, Revin; Rm, Reims; R, Rouen; S, Soissons; Se, Sedan; Sn, Sens; StQ, St Quentin; StD, St Dizier; T, Tours; Te, Le Tréport; To, Toul; Tr, Troyes; V, Verdun; Vi, Vitry-le-François.

villages lie on the slopes of the plateau, and where agriculture also meets the local demand of the urban populations of Reims (117,000) and Epernay (20,000). Reims is an important provincial city, with its market and ecclesiastical functions as well as a long-established textile industry now employing 20,000 people. Towards the frontier there is a belt of considerable agricultural population in the heavier soils at the foot of the Ardennes.

To the east, all these traditionally fruitful regions come relatively sharply against the curving belt of the chalk of Champagne *pouilleuse*, where a dry subsoil and absence of loam covering involve a decline of cultivation. The density of population changes sharply to a figure of 15 inhabitants to the sq. km. over considerable areas, a density comparable to that of mountain regions. Champagne is a prominent area of sparsity on the population map of France. Settlement is concentrated along the river valleys, and over a large area there are only two towns of any size, Châlons-sur-Marne (35,000) and Troyes (58,000), with its textile and metallurgical industries. Eastwards beyond the chalk lies the narrow arc of humid Champagne, where the fertile Gault clays and intercalated sands form the basis of a larger and much more evenly spread population, although the few towns, such as St Dizier (19,000), all have populations below 20,000. Eastwards, again, is a further arc, of the Jurassic rocks; on the lower ground these carry a fair population, though to the north the belt thins out into the wooded heights of the Argonne, where villages are infrequent. The plateau of the Oolitic limestone is broken up by the rivers, and in detail the population, which is not considerable, is unequally distributed, frequently seeking valleys where marls and clays are exposed. Here again towns are small: Bar-le-Duc (17,000) and Commercy (7,000), together with St Dizier in the Gault region, carry on a small metallurgical industry of long standing, accounting for small areas of denser population. Here, at the Meuse, Lorraine is reached; more to the south the limestone plateau widens, and on the porous soils the villages become infrequent, usually seeking the marls and clays of the valleys. The only town of importance is Chaumont (18,000), on the upper Marne. This region around the headwaters of the Seine and Aube stands out as a large area of scanty population, and separates the Paris Basin from Burgundy.

Along the northern border of the Central Massif is a belt of territory composed of several geological formations where the sedimentary beds of the Paris Basin meet the older rocks of the plateau. Agricultural possibilities vary considerably, and small productive districts, mainly

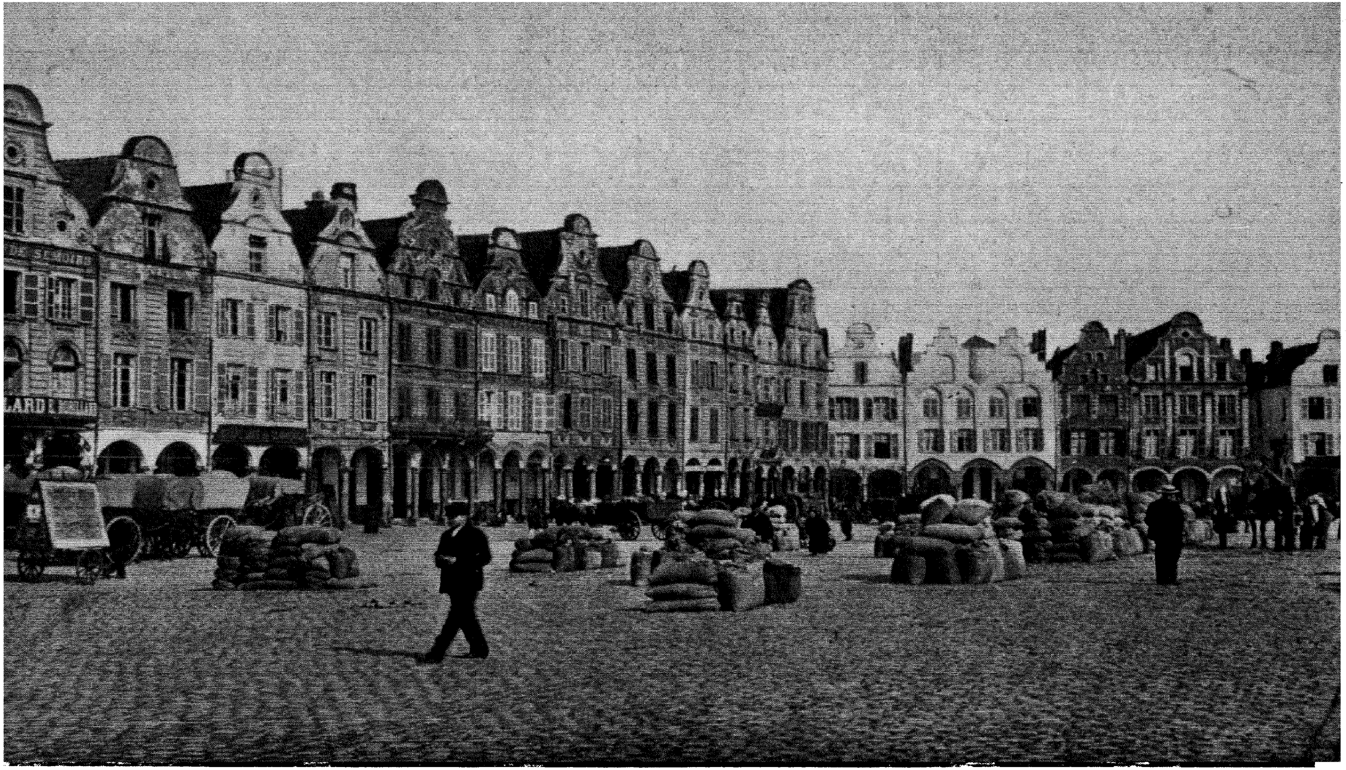


Plate 1. The *Grande-Place*, Arras

The open cobbled market-place is typical of many French towns. The great square at Arras is the most complete specimen of seventeenth-century Flemish architecture in France; it has been largely restored after sustaining heavy damage during the war of 1914–18.

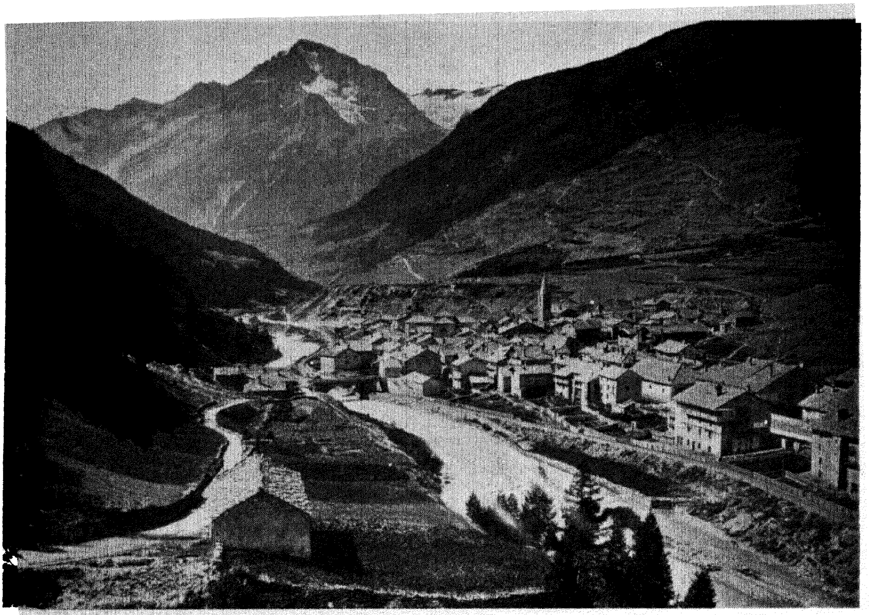


Plate 2. Lanslebourg in the Arc valley (Savoie)

The town is strung out along the Mt Cenis road on the sunny south-facing slope (*adret*) of the narrow Arc valley. The north-facing slope (*ubac*) is forested; on the opposite side are cultivated fields and pastures. The hotels only function during the period May-October, when traffic over the Mont Cenis and Iseran passes is possible.

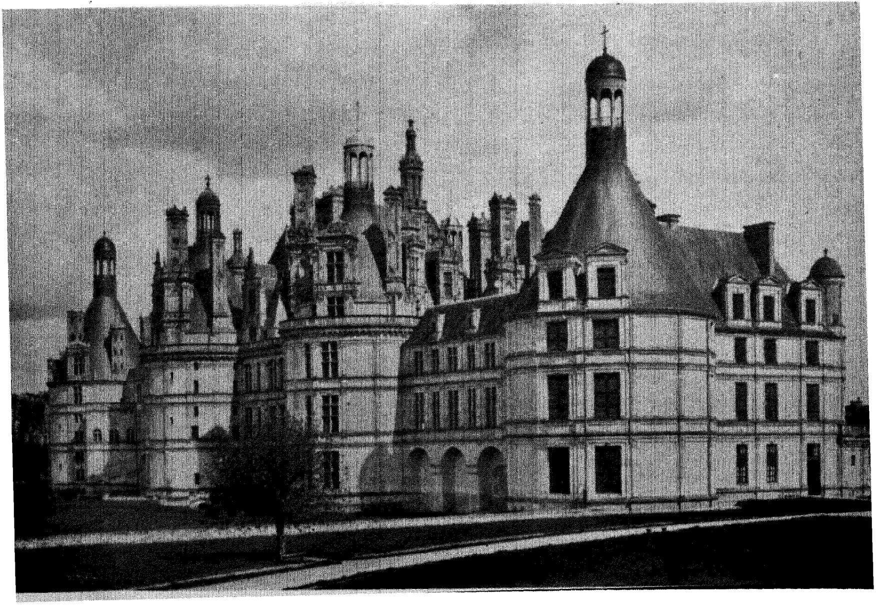


Plate 3. The Château of Chambord

This is perhaps the most impressive of all the French châteaux; situated near Blois in the Loire valley, it dates from the early sixteenth century.

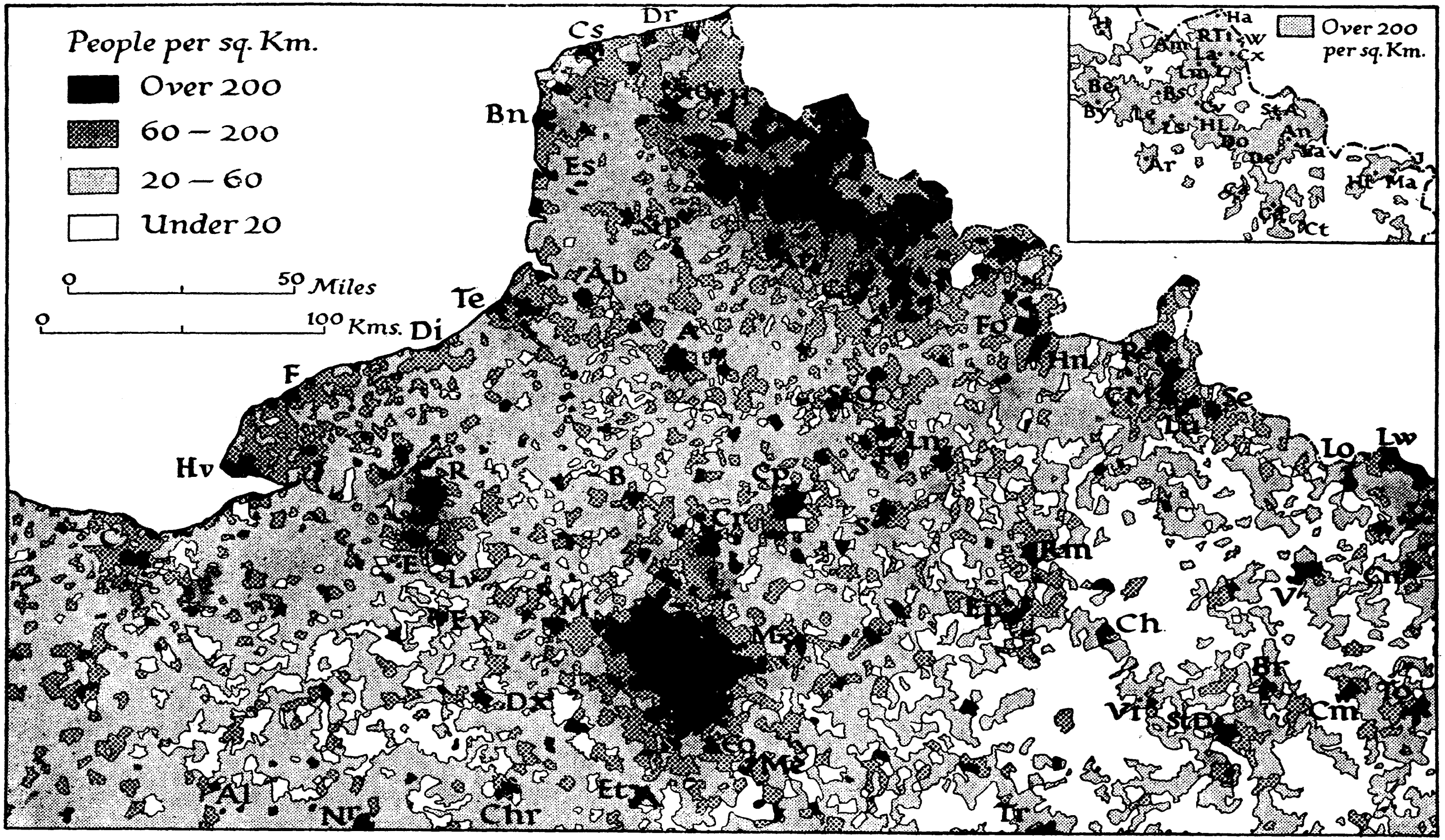
along the rivers, are separated from each other by larger thinly inhabited areas, and, surprisingly enough, the agricultural population in these areas of sparsity is thinner than on the plateau to the south. The towns derive some importance from their position on the plateau borders and in a region of varied soils—such are Vierzon-Ville, -Forges and -Village (26,000), Châteauroux (28,000), Issoudun (11,000) and Nevers (34,000). In these towns, as in Bourges, a variety of metal industries are carried on. Bourges (49,000) is an important centre of communications, with engineering and other industries.

(3) *Northern France* (Fig. 4)

Northern France is clearly dominated by the industrial region of the coalfield. The department of the Nord supports a population of 2,022,000 and the Pas-de-Calais 1,179,000. Here occurs an example of that landscape of spreading towns and cities so often found in Great Britain. The industrial population is concentrated in three main groups: (1) the northern area near the Belgian frontier with the cities of Roubaix-Tourcoing and Lille; (2) the central arc of the coalfield itself, stretching from east to west; (3) more detached towns to the south of the coalfield.

In the north, only 5 km. from the Belgian frontier, lies Tourcoing (78,000), hardly to be distinguished from Roubaix (107,000). Eastwards from Roubaix, its satellite of Wattrelos (31,000) reaches almost to the frontier. The centre of Lille (200,000) is only 11 km. from the centre of Roubaix in a south-westerly direction, and the intervening country is largely occupied by three satellite towns. Lille is the seat of textile, chemical, metallurgical and engineering industries and is the commercial metropolis of northern France (see pp. 408–10). It is closely packed within restricted administrative limits, so that it stands only seventh among French cities. Around it, however, and virtually contiguous, lie nine administrative towns with populations ranging from 10,000 to 21,000, and many smaller urban areas. Altogether, Lille, Roubaix, Tourcoing and their tributary towns and suburbs contain nearly 750,000 people. In contrast, Armentières (24,000) stands isolated, a short distance to the north-west.

A few kilometres to the south of Lille is Carvin (19,000), and with Lens (33,000) and Douai (42,000), the centre of the coalfield is reached. Throughout the entire length of the mining belt there is no great city, although there are twenty-three administrative towns with populations exceeding 10,000, from Valenciennes (42,000) in the east to Bruay-en-Artois (32,000) in the west, of which Valenciennes is the


People per sq. Km.
Over 200
60 – 200
20 – 60
Under 20
0
50 Miles
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100 Kms.
Over 200 per sq. Km.
Cs
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Fig. 4

largest. In such a region of mines and factories, however, administrative boundaries are very imperfectly related to the formless urban settlements and mining villages.

Bordering the coalfield to the south, but separated from it, are the more isolated textile centres of Arras (34,000), Cambrai (29,000) and Caudry (13,000); farther east, near the Belgian frontier, lies Maubeuge (23,000), with metallurgical industries. To the south-east is a more isolated centre of population: Fourmies (14,000), with the important railway centre of Hirson (11,000) nearby, and farther east again, on the Meuse, is Charleville-Mézières (31,000) at a meeting point of several railways and the seat of a variety of metallurgical industries. Higher up the river lies Sedan (18,000).

Beyond the western limits of the coalfield lie two towns which mark a transition to the farms of Flanders—St Omer (18,000) and Hazebrouck (15,000), which are textile manufacturing towns as well as market centres. In the Flanders agricultural area farming is intensive to meet urban demands. It is a countryside of many scattered farms, at no great distance from each other. Near the reclaimed coastal marshes the farms are often strung in lines along the dykes. The coastline of northern France is the site of no large centre of population, although Calais (67,000) and Boulogne (52,000) are actually the largest administrative towns in the department of the Pas-de-Calais. Dunkirk (31,000) carries on few of the industries so often found in a great port, and hence its population is comparatively small. Virtually adjoining it, however, lies four small towns—St Pol-sur-Mer (13,000), Malo-les-Bains (11,000), Coudekerque-Branche (13,000)

Fig. 4. The distribution of population in northern France, 1931

Based on the *Atlas de France*, Plate 73 (Paris, n.d.).

A, Amiens; Am, Armentières; Ab, Abbeville; Al, Alençon; An, Anzin; Ar, Arras; B, Beauvais; Be, Béthune; Bn, Boulogne; Br, Bar-le-Duc; Bs, La Bassée; By, Bruay-en-Artois; C, Caen; Ca, Cambrai; Cd, Caudry; Ch, Châlons-sur-Marne; Cm, Commercy; Cn, Conflans; Co, Corbeil; Cp, Compiègne; Cr, Creil; Cs, Calais; Ct, Le Cateau; Cv, Carvin; Cx, Croix; Chr, Chartres; CM, Charleville-Mézières; Dx, Dreux; De, Denain; Di, Dieppe; Do, Douai; Dr, Dunkirk; E, Elbeuf; Ep, Epernay; Es, Etaples; Et, Etampes; Ev, Evreux; F, Fécamp; Fe, La Fère; Fo, Fourmies; H, Hazebrouck; Ha, Halluin; Hn, Hirson; Ht, Hautmont; HL, Hénin Liétard; Hv, Havre; J, Jeumont; L, Lille; La, La Madeleine; Le, Lievin; Lm, Lomme; Ln, Laon; Lo, Longuyon; Ls, Lens; Lu, Lumes; Lv, Louviers; Lw, Longwy; M, Mantes; Ma, Maubeuge; Me, Melun; Mx, Meaux; Nr, Nogent-le-Rotrou; RT, Roubaix-Tourcoing; Re, Revin; Rm, Reims; R, Rouen; S, Soissons; Se, Sedan; StA, St Amand; StD, St Dizier; StO, St Omer; StP, St Pol; StQ, St Quentin; To, Toul; Te, Le Tréport; Tr, Troyes; V, Verdun; Va, Valenciennes; Vi, Vitry-le-François; W, Wattrelos.

and Rosendaël (17,000), and the population of 'Greater Dunkirk' reaches 95,000.

Southwards from the industrial region is an area which, as might be expected, has frequent patches of denser population. Besides the two ancient cities of Amiens (94,000) and St Quentin (49,000), with their textile industries, are smaller centres of population created largely by the heavy road, rail and canal traffic between the north and Paris, especially along the Oise canal, one such centre being Chauny-Tergnier-La Fère, at the junction of the Oise and St Quentin canals, although there is no pronounced belt of population. The agricultural population, save for limited areas, is denser than in much of France, for farming is often intensive, both on the clay-with-flints of Picardy and neighbouring parts of Normandy and on the *limon* of eastern Artois and Picardy. The urban demand for milk and market-garden produce is considerable, and is augmented by that from the Channel ports and small resorts. In the Santerre, Vermandois and Cambrésis the villages are hardly 3 km. apart. They lie as a rule on the low plateaux, drawing water from the surface-soil layers, and in the valleys or near water sources lie towns, mills and factories. Though the geological foundation of this region is very similar to the chalk of Champagne, settlement is much more free in its location owing to the considerable thickness of surface soil. Southwards, towards Paris, the two largest towns are Beauvais (19,000) and Compiègne (19,000).

(4) *Eastern France* (Fig. 5)

In France east of the Meuse there is a considerable population, amounting to 3,000,000, and showing great variations in its distribution. Between Meuse and Moselle is a moderate agricultural density; east of the Moselle this increases, except for small areas, to a maximum in the plain of Alsace bordering the Rhine. There is a productive and long-established agriculture. The extensive, high and level plains of Lorraine, crossed by northward-flowing rivers and the eastward-facing escarpments or 'Côtes', offer a great variety of resources to its inhabitants—wood, water, and soils suitable for arable land, orchard or meadow. In general the soils are heavy but well repay the great efforts necessary for their cultivation. In the vales the villages are numerous, often seeking an elevated site, so as to avoid damp clay, and along the côtes they stand half-way up. The natural subdivisions of the region, resulting from the cutting through of the côtes by the originally consequent streams, together with the traffic of ages between the Paris Basin and the Rhine, favoured the development of a number of towns, like Verdun (19,000), Toul (13,000), Lunéville and Metz. In Alsace agriculture offers rather greater contrasts than in Lorraine. On the western and gentler slopes of the Vosges a comparatively dense population is widespread in the south; here the soils derived from granite are more hospitable and the original forest cover has been extensively cleared. The lower sandstone Vosges to the north carry a smaller population and retain more of the forest. Rural settlement on the western slopes is considerably scattered; on the eastern slopes single farms are found only at the higher altitudes, and lower down villages become the rule. The elevated loess belt or apron at the foot of the Vosges carries the greatest population; distribution is more irregular near the Ill and the Rhine owing to the occurrence of coarse gravel and of swampy ground, and settlement sites are more selective. Between Mulhouse and Belfort, at the south end of the plain, lies the Sundgau, and among the pebble deposits on this terrace the agricultural population is sparser and unevenly spread. An active town life in Alsace, as in Lorraine, has been long established. On the western slopes of the Vosges, with the help of water power and timber supplies, several small towns early developed small industries, such as textiles and leather, with paper and metal goods later on: such are Saint-Dié (20,000), Remirement (10,000) and Epinal. To the east, each valley opening into the Plain of Alsace has a small town at its foot, while Strasbourg, Colmar and Mulhouse early acquired importance from their location on busy routes, and the two latter developed textile industries; small textile centres extend into the Vosges towards Saint-Dié on the western side.

With the nineteenth century came urban expansion, complicated at times by the political changes in the region. Many of the little towns have grown only slowly or even declined: the population of Epinal has fallen from 30,000 (1911) to 28,000 (1936). In the plain of Alsace, Colmar (49,000) and Mulhouse (98,000) are the centres of a large-scale cotton industry. Strasbourg has shown a steady expansion in recent years: the city has 193,000 inhabitants, its neighbour Schiltigheim 22,000, and the whole agglomeration 268,000 (see pp. 337–41). Saverne, near the Saverne gap, remains small; to the north-east is Haguenau (22,000), centre of an agricultural district. Lorraine has experienced both city growth and the appearance of mining villages following the rise of the large-scale metallurgical industries. The chief centre is Nancy, which grew rapidly from 53,000 to 80,000 in 1870–80, reached 120,000 in 1911, and after a relapse has now attained the

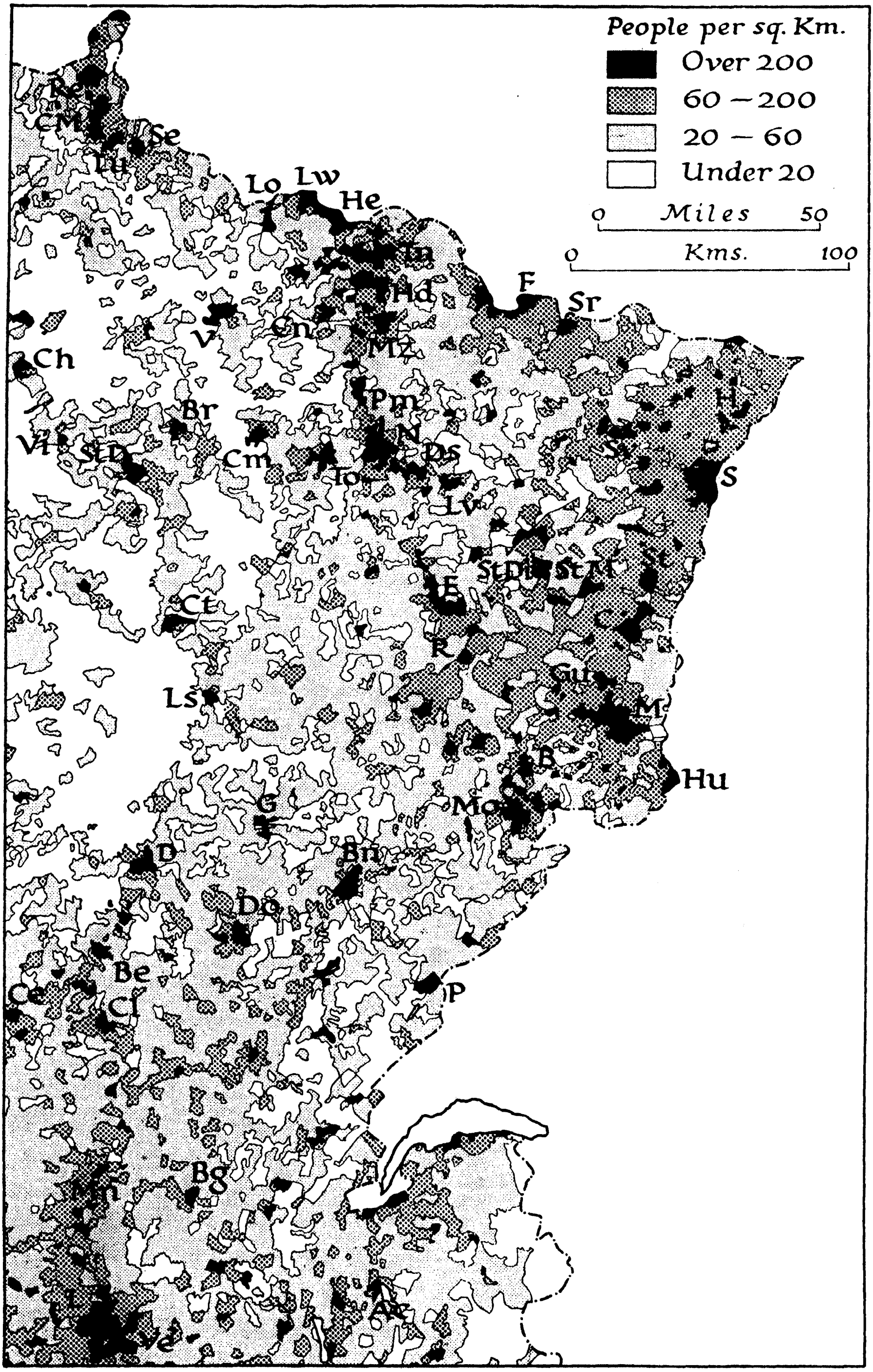
People per sq. Km.
Over 200
60 — 200
20 — 60
Under 20
0 Miles 50
0 Kms. 100
Re
CM
Se
Lu
Lo
Lw
He
In
Hd
F
Sr
Ch
V
Cn
Mz
Pm
H
Br
N
Ds
Vi
StD
Cm
To
Sv
S
Lv
St
StDi
StA
E
Ct
R
Gu
Ls
M
B
Hu
Mo
G
D
Bn
Do
Be
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Fig. 5

same figure. For about 10 km. above and below on the Meurthe extends a string of industrial towns and villages, and the entire group from Pompey-Frouard to Dombasle has a population of 200,000 Ten kilometres farther upstream is Lunéville (24,000), with an expanding population based upon engineering industries. In the north, towards the frontier, lie three more diffuse groups: the largest is the Briey-Thionville group of three valleys, totalling 155,000; westwards is the small Longwy mining region; eastwards is the group of small towns dependent upon the Saar coalfield, none of which is very large. Centrally placed among all these populations is Metz (83,000), important mainly for industries related to the agriculture of the surrounding district. A short distance to the south-west of Mulhouse, where the Doubs enters in a southward course, lies a prominent area of industrial population. Belfort (45,000), besides being an important military and railway centre, is the seat of heavy electrical industries. Only 12 km. to the south is Montbéliard (14,000), which carries on a considerable clock-making industry as well as textile and light metal industries. Around it lie several smaller towns, like Audincourt, which are similarly engaged.

(5) *West and South-Western France* (Fig. 6)

From the Loire to the Garonne. Below Orléans the valley of the Loire shows a greater density of population, which is based primarily upon a more intensive agriculture, especially the culture of the vine, and distributed in a series of denser areas rather than in a continuous belt. Settlement sites show considerable variation; villages avoid the lower alluvial stretches liable to flooding, while many single farms lie on or near levées and reclaimed land dating from various periods since the Middle Ages. Each stretch of denser population centres upon one of the Loire towns, which succeed each other at fairly regular

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Fig. 5. The distribution of population in eastern France, 1931

Based on the *Atlas de France*, Plate 73 (Paris, n.d.).

Ac, Annécy; B, Belfort; Be, Beaune; Bg, Bourg; Bn, Besançon; Br, Bar-le-Duc; C, Colmar; Ch, Châlons-sur-Marne; Cm, Commercy; Cn, Conflans; Ce, Le Creusot; Cl, Chalon-sur-Saône; Ct, Chaumont; CM, Charleville-Mézières; Ds, Dombasle; D, Dijon; Do, Dôle; E, Epinal; F, Forbach; G, Gray; Gu, Guebwiller; H, Haguenau; Hd, Hagondange; He, Hérupt; Hu, Huningue; L, Lyons; Lo, Longuyon; Ls, Langres; Lu, Lumes; Lv, Lunéville; Lw, Longwy; M, Mulhouse; Mn, Mâcon; Mo, Montbéliard; Mz, Metz; N, Nancy; P, Pontarlier; Pm, Pont-à-Mousson; R, Remiremont; Re, Revin; S, Strasbourg; Se, Sedan; Sr, Sarreguemines: St, Sélestat; Sv, Saverne; StD, St Dizier; StDi, St Dié; StM, St Marie-aux-Mines; To, Toul; Tn, Thionville; V, Verdun; Vi, Vitry-le-François; Ve Villeurbanne

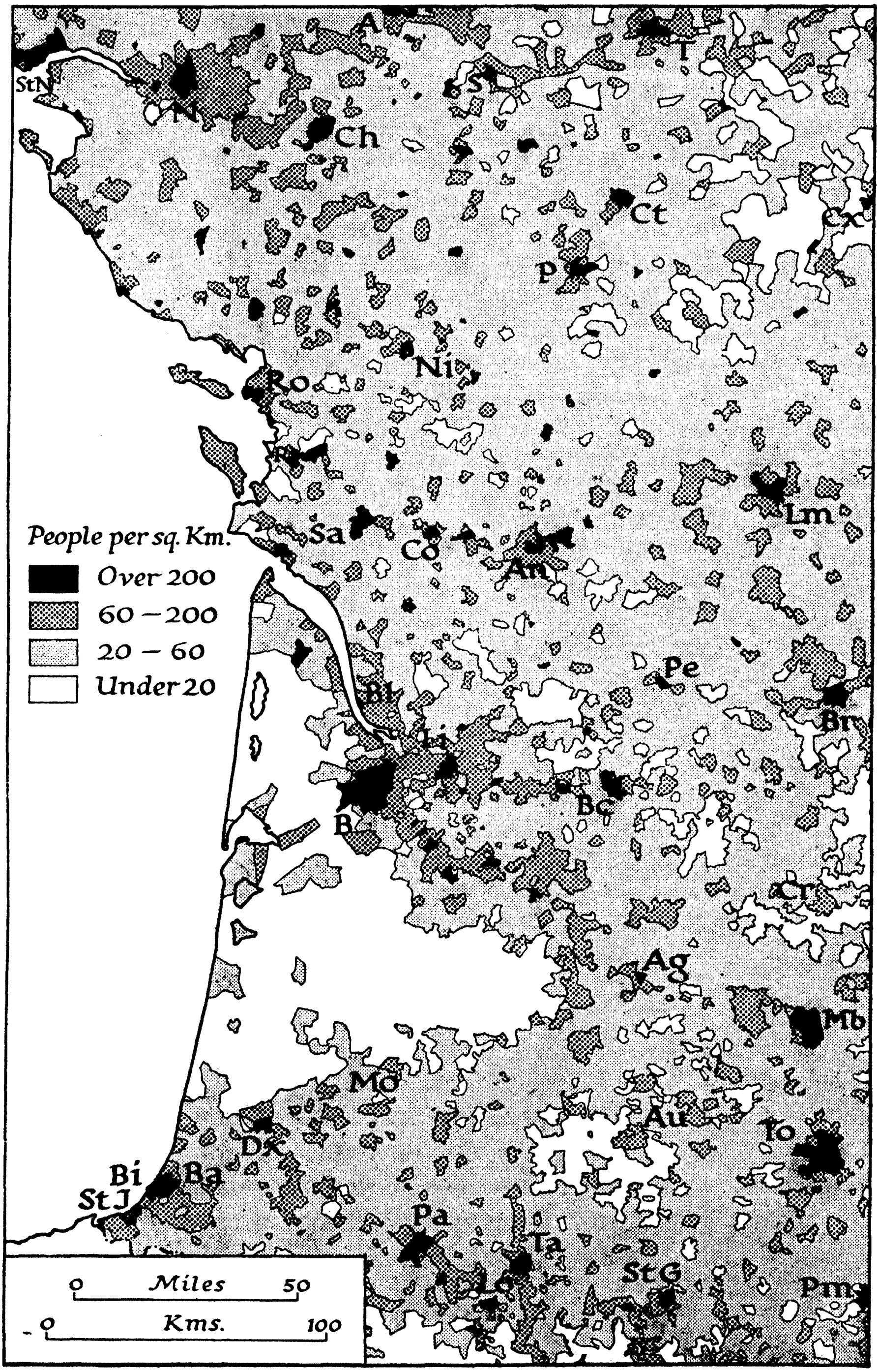
People per sq. Km.
Over 200
60 – 200
20 – 60
Under 20
0 Miles 50
0 Kms. 100
A
T
StN
N
S
Ch
Ct
Cx
P
Ni
Ro
R
Lm
Sa
Co
An
Pe
Bl
Li
Br
B
Bc
Cr
Ag
Mb
Mo
Au
To
Dx
Bi
Ba
St J
Pa
Ta
StG
Lo
Pm

Fig. 6

intervals—Blois (26,000), Tours (84,000), Saumur (17,000) and Angers (88,000), the larger of which are important centres of communication. The valley population is largest around Nantes (195,000), being increased both by the demand from the city for agricultural produce and by the outward spread of subsidiary urban settlement; the total population of Nantes and its satellites approaches a quarter of a million. On the south bank of the river stands Réze (13,000). At the mouth of the estuary is the great shipbuilding centre of St Nazaire (43,000).

South of the Loire, between the Central Massif and the sea, the distribution of population calls for little remark. It is an extensive region, devoted entirely to agriculture, in which the southern extension of the Armorican rocks in the Vendée carries a greater density than the sedimentaries around Poitiers; in the Vendée, however, the concentration of population is inland rather than along the coast as in Brittany. Cholet (23,000) and Niort (28,000) are market centres; Poitiers (44,000) derives a rather greater importance from its position on the main route between the Aquitaine and Paris Basins. Farther south the important wine district along the Charente appears as a narrow belt of greater density of population, involving a group of towns: Angoulême (39,000) and Saintes (21,000) are inland centres; Rochefort (29,000) is a minor naval base, and Tonnay-Charente is the port for the Cognac district. A little to the north of the latter is the fishing port of La Rochelle (48,000), which, with its newly developed port of La Pallice, is a competitor of Bordeaux for the trade of western France.

The Aquitaine Basin. The most striking feature of the map of this region is the gap created by the Landes. Here, in an area considerably larger than the whole of Devonshire (800,000 hectares), the presence of sands and the imperfect drainage repel settlement, and make the region one of the most thinly populated in Europe. What settlement there is tends to follow the streams; one thin belt of population lies close to the coast, near the étangs, while another concentrates along

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Fig. 6. The distribution of population in south-western France, 1931

Based on the *Atlas de France*, Plate 74 (Paris, n.d.).

A, Angers; Ag, Agen; An, Angoulême; Au, Auch; B, Bordeaux; Ba, Bayonne; Bc, Bergerac; Bi, Biarritz; Bl, Blaye; Br, Brive; Cr, Cahors; Ch, Cholet; Co, Cognac; Ct, Châtellerault; Cx, Châteauroux; Dx, Dax; Lm, Limoges; Li, Libourne; Lo, Lourdes; Mb, Montauban; Mo, Mont-de-Marsan; N, Nantes; Ni, Niort; P, Poitiers; Pa, Pau; Pe, Périgeux; Pm, Pamiers; R, Rochefort; Ro, La Rochelle-La Pallice; S, Saumur; Sa, Saintes; StG, St Gaudens; StN, St Nazaire; StJ, St Jean-de-Luz; T, Tours; Ta, Tarbes; To, Toulouse.

the two Leyre rivers; on the landward circumference is a zone of colonization.

In the main part of the basin, of a total population of nearly 3,000,000, nearly half, or 1,200,000, is concentrated in the two departments of Gironde and Dordogne. This dense population along the lower Garonne and lower Dordogne and its tributaries, and along the Gironde estuary, stands out clearly enough on the map. Here a number of famous wine districts lie close to each other, while the urban centres further increase the population of the surrounding countryside. Bordeaux (258,000) has seven smaller towns adjoining—Bègles, Caudéran, Talence, Le Bouscat, Mérignac, Pessac and Cenon. The populations of these satellites range from 23,000 to 10,000. Down the estuary are Blaye and the oil ports of Pauillac and Bec d'Ambes. In 1936 the city and tributary urban centres contained 400,000 inhabitants. To the east is the small town of Libourne (19,000) on the Dordogne, and beyond, not far from the borders of the Central Massif, are Périgueux (37,000) and Bergerac (19,000). In the Garonne Basin a succession of well-peopled districts follows the river valley to a point beyond Toulouse. Generally speaking, agriculture in this middle zone is more varied and more intensive than towards the fringes of the basin, although tongues of vine growing reach up the lower valleys of the tributaries, and away from the main stream population density is lower.

Towards the Central Massif it diminishes rapidly on meeting the Causses; on the southern side of the basin it continues fairly evenly, spreading out into a broad triangle to the Pyrenean foot-hill zone, except for an island of sparsity on the detritus plateau of Armagnac, near Auch. In the centre of the basin lies the small market centre of Agen (27,000), limited in its development by the existence of two great cities at either end. Urban centres are more widely distributed in the east than in the west. Toulouse (213,000) continues its growth, based as it is upon a variety of factors. It functions as economic capital for the eastern part of the basin as well as for the central Pyrenean region, it commands the Languedoc corridor to the Mediterranean, and it benefits from a strategic location on the electricity grid connecting the Pyrenees and Central Massif. The other towns of this region lie close to the edge of the plateau, and derive some importance from their position at a junction of different types of economic region—Montauban (32,000), Albi (30,000) and Castres (29,000). Albi and Castres, together with the smaller town of Carmaux (10,000), possess industries based upon hydro-electric power from the Central Massif,

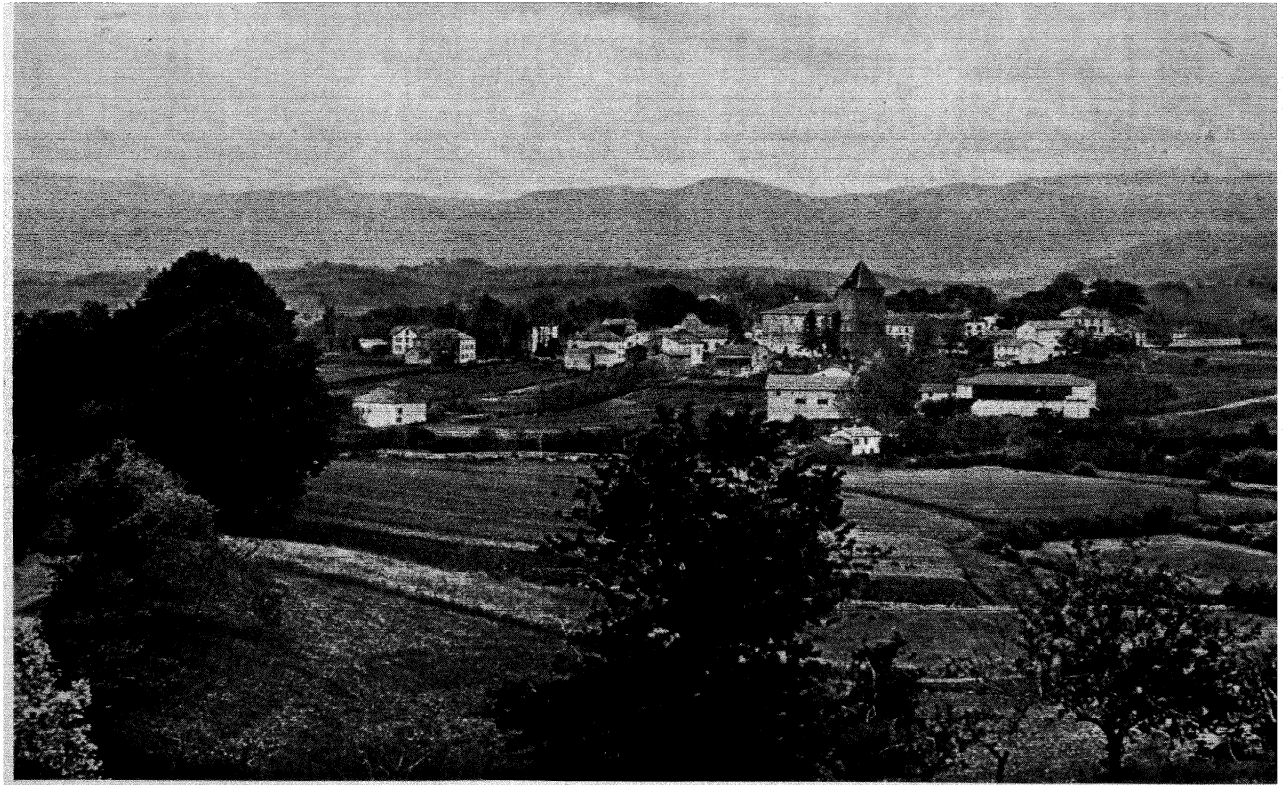

Plate 4. Sare (Basses-Pyrénées)

The village comprises a small cluster of houses around the church, with numerous outlying dwellings set in an undulating landscape of enclosed fields. In the background are the Pyrenean foot-hills.

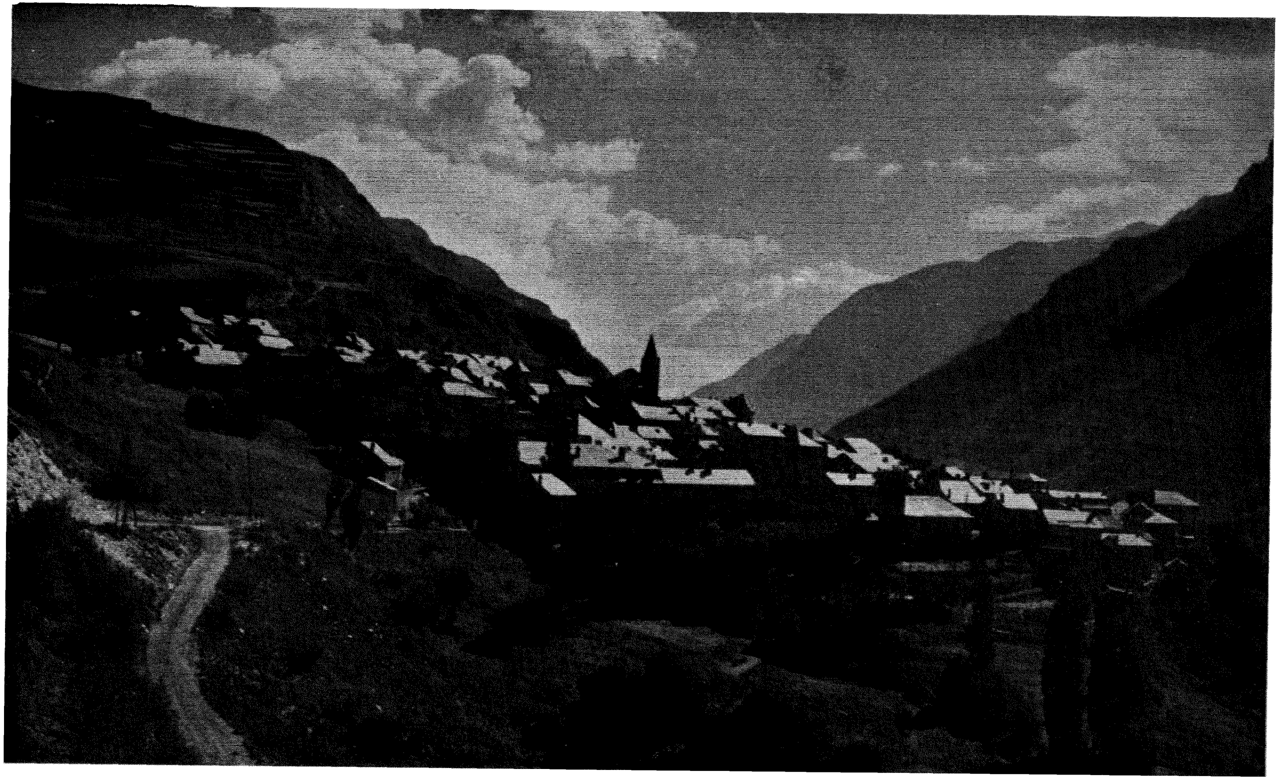

Plate 5. La Grave (Hautes-Alpes)

The village of La Grave (1,482 m. above sea level), a popular tourist centre, is situated on a shoulder about 100 m. above the Romanche valley, which leads to the Col du Lautaret. Above the village are the *alps*, which in summer yield crops of hay and potatoes.

and from the small coalfield at Carmaux. Mazamet (15,000), besides manufacturing woollen goods, is a centre for the cleaning of wool.

(6) *The Central Massif* (Fig. 7)

In this extensive region the main factors affecting the distribution of agricultural population are elevation and soil characteristics. The high plateaux of over 1,000 m. are sparsely populated, while the low plateau of Limousin at 300 m. carries a fairly dense population. In the high Auvergne, however, fertile volcanic soils form the basis of well-peopled villages and a number of small towns at a height of 1,000 m. In the basins of the north-east settlement is not so widespread as might be expected owing to inadequate drainage of heavy soils.

In the west lies the Limousin, composed largely of a low plateau of granitic soils surrounding a high plateau of ancient eruptive rocks. The high ground stands out as an area of sparsity in Fig. 7; here the basis of life is a rather poor agriculture with rye as an important crop and the grazing but not fattening of cattle. On the lower tableland, called locally the 'Besse', the soil is deeper and the climate less harsh. Cereal growing, irrigated meadows, chestnut trees, and the famous Limousin cattle support an active population. The regional capital is Limoges (95,000) with its famous pottery industry. The smaller towns are market centres like Aubusson and Guéret, usually situated near the junction of the high and low tablelands. On the southern border of the main plateau lies Brive (29,000), the market town of a fertile district of Trias rocks, and nearby, on the edge of the plateau, is Tulle (15,000).

To the south of the Brive basin appears an isolated area of low population density, where a considerable extent of Oolitic limestone at a height of from 300 to 500 m. limits the possibilities of human occupation. Fragmentary settlement is found over the limestone plateaux, but the greater part of the population is concentrated in the valleys. This is the region of the 'Little Causses'. In the south-eastern extremity of the Central Massif lies a more pronounced limestone country—the 'Great Causses'. The surface here is often 750–1000 m. high, and forms a stony desert. Sheep rearing supports a scanty population; agricultural settlement is confined to the narrow valleys; where topography and water supply permit, fruitful cultivation is possible in this southern latitude. The area of sparse population extends south-westwards almost to the Gate of Carcassonne over a triangular block of Palaeozoic rocks. Here, however, the valleys are

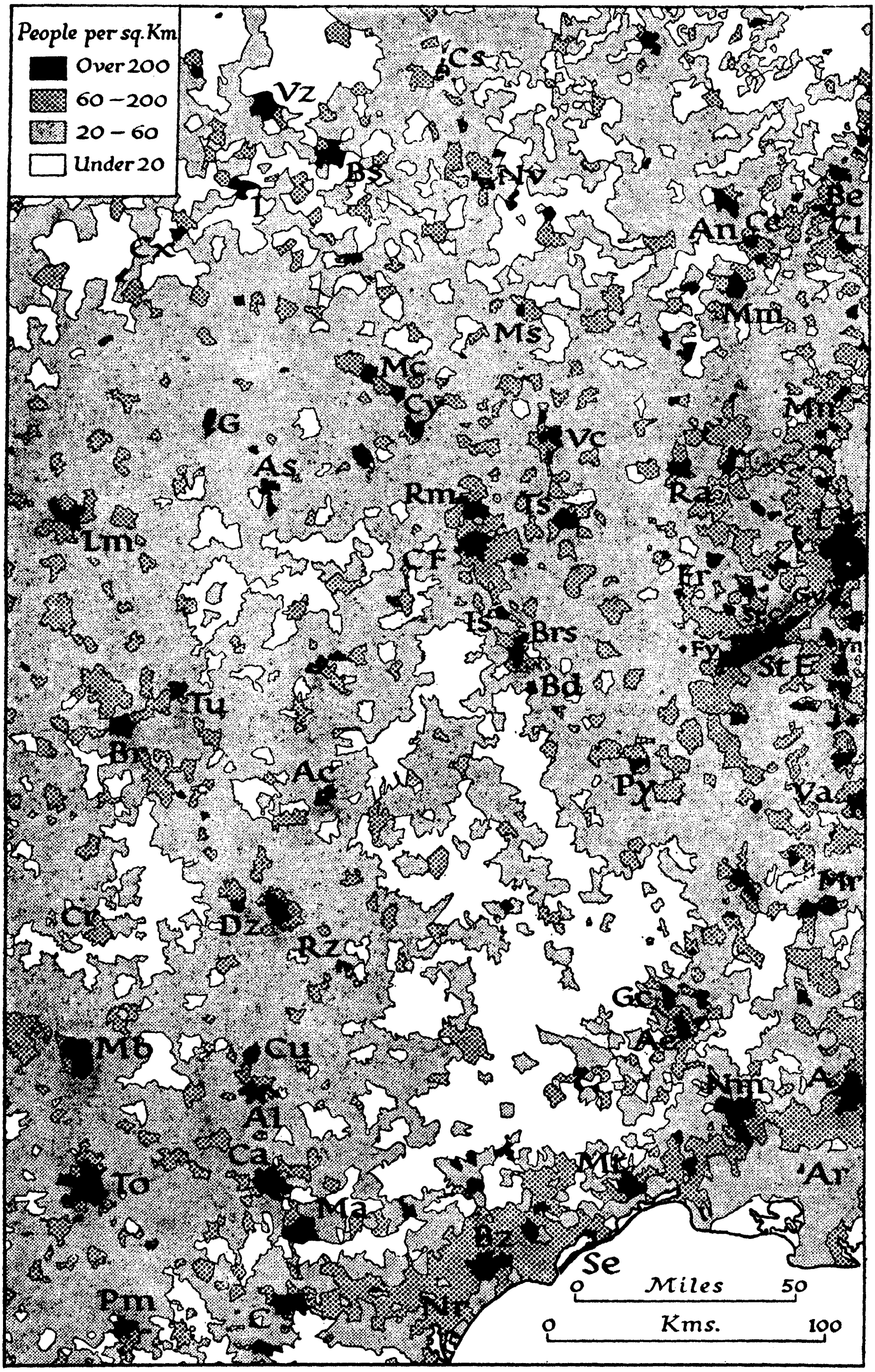
People per sq. Km
Over 200
60 – 200
20 – 60
Under 20
Vz
Cs
Bs
Nv
T
Cx
An
Ce
Be
Cl
Mm
Ms
Mc
Cy
G
Vc
As
Rm
Ts
Ra
Mn
Lm
CF
Fr
Is
Brs
Fy
St E
Bd
Tu
Br
Ac
Py
Va
Cr
Dz
Rz
Mr
Gc
Ae
Mb
Cu
Al
Nm
A
Ca
To
Mt
Ar
Ma
Bz
Se
Pm
C
Nr
0 Miles 50
0 Kms. 100

Fig. 7

wider, and form tongues of populated territory alternating with ridges like the Espinouse and Montagne Noire. Towards the south-western edge of the main plateau lie the administrative and market centres of Rodez (18,000) and Millau (16,000), and Decazeville (12,000), centre of a small coalmining centre.

East of the Causses towards the Rhône the area of sparsity is still considerable. Here is the high edge of the Massif, the Cevennes, where altitude is the main factor inimical to any dense settlement. Population increases rapidly, however, as altitude diminishes towards Languedoc. First comes a belt of hamlets in a pastoral zone, then the villages in the chestnut zone, where cultivation increases, and finally the zone of Mediterranean cultivation is reached. A ridge of highland approaching close to the sea, between the river Hérault and Montpellier, results in an extension of the area of sparse settlement into the lowland.

Auvergne, the heart of the Central Massif, includes lands of widely varying densities of population. The great area of sparsity in the south-east of the main plateau extends inwards towards the centre through the high mountains of Aubrac and Margeride. Around the two principal massifs of recent lava, the Velay and the Cantal-Dore, population is a little complicated in its distribution. In places elevation is reduced in its effects by the great fertility of the volcanic soils. The 'planaises' or lava plateaux provide excellent pastures which carry more animals than most parts of the Central Massif. Along the edges of the volcanic massifs is a series of valleys in which agriculture supports a considerable population. At the openings of the valleys, especially where the volcanic soils meet the poorer soils of the granite, are a number of little market and fair towns, some no larger than big villages, both around the Cantal and Dore massifs, while on the limits

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Fig. 7. The distribution of population in the Central Massif and its borders, 1931

Based on the *Atlas de France*, Plates 74, 75 (Paris, n.d.).

A, Avignon; Ac, Aurillac; Ae, Alès; Al, Albi; An, Autun; Ar, Arles; As, Aubusson; Bd, Brioude; Be, Beaune; Br, Brive; Bs, Bourges; Bz, Béziers; Brs, Brassac; C, Carcassonne; Ca, Castres; Ce, Le Creusot; Cr, Cahors; Cl, Chalon-sur-Saône; Cs, Cosne; Cu, Carmaux; Cx, Châteauroux; Cy, Commentry; CF, Clermont-Ferrand; Dz, Decazeville; Fr, Feurs; Fy, Firminy; G, Guéret; Gc, La Grand-Combe; Gv, Givors; I, Issoudun; Is, Issoire; L, Lyons; Lm, Limoges; Ma, Mazamet; Mb, Montauban; Mc, Montluçon; Mm, Montçeau-les-Mines; Mn, Mâcon; Mr, Montélimar; Ms, Moulins; Mt, Montpellier; Nm, Nîmes; Nr, Narbonne; Nv, Nevers; Pm, Pamiers; Py, Le Puy; Ra, Roanne; Rm, Riom; Rz, Rodez; Se, Sète; StC, St Chamond; StE, St Etienne; To, Toulouse; Ts, Thiers; Tu, Tulle; Va, Valence; Vc, Vichy; Vn, Vienne; Vz, Vierzon.

of the Cantal are several larger towns, Aurillac (19,000), Mauriac (3,300) and St Flour (5,000).

In the remaining north-eastern part of the Central Massif the population, broadly speaking, attains everywhere a moderate density and there is a considerable urban development. The long tongues of Archaean rocks, trending northward, are lower, and more agriculture is possible, except in the ridge of the Forez, lying between the Loire and Allier. It is mainly the occurrence of sedimentary basins, however, which enables a denser settlement to exist. The principal of these is the Limagne, along the Allier, extending through the Limagne Bourbonnais to the northern edge of the plateau. Population tends to avoid the lowest levels, which are too damp, and concentrates towards the highlands on either side, especially at the foot of the Dore and Puy de Dôme. In the east of the Limagne is the old manufacturing centre of Thiers (16,000); on the west lies Clermont-Ferrand, for long functioning as a market centre for the Limagne but rejuvenated in the twentieth century by its rubber and engineering industries (101,000). Nearby is Riom (11,000) and the spa of Vichy (25,000). In the Limagne Bourbonnais stands Moulins (22,000), and some distance to the west, in a small basin, Montluçon (42,000), which has rubber and engineering industries. Commentry (nearly 10,000) is a small mining and engineering centre. The basins along the Loire are more variable in their attractiveness to settlement. The uppermost around Le Puy (21,000) is the most fertile of all owing to the presence of lava downwash from the surrounding volcanic hills. The Bassin de Forez is, in the main, too ill-drained to support much settlement. There is more lower down in the Roannais, and Roanne (41,000) has developed textile industries.

(7) *The Pyrenees* (Fig. 8)

The highest settlements in the Pyrenees are poor hamlets in the pastoral zone. Lower down, at about 1,000 m., are a number of isolated pockets of denser population, in scattered farms and hamlets, and maintained by varied resources of meadows, orchards, patches of arable land, and timber. Small-scale local industries and a few mineral workings have provided a further means of livelihood. In the last 25 years the considerable development of hydro-electricity has contributed to an increase of population in many of the valleys. Some of the factories are located high up near the stations, but there has been a spread of decentralized industry among villages and small towns where the valleys broaden, like Lannémazan, Marignac and

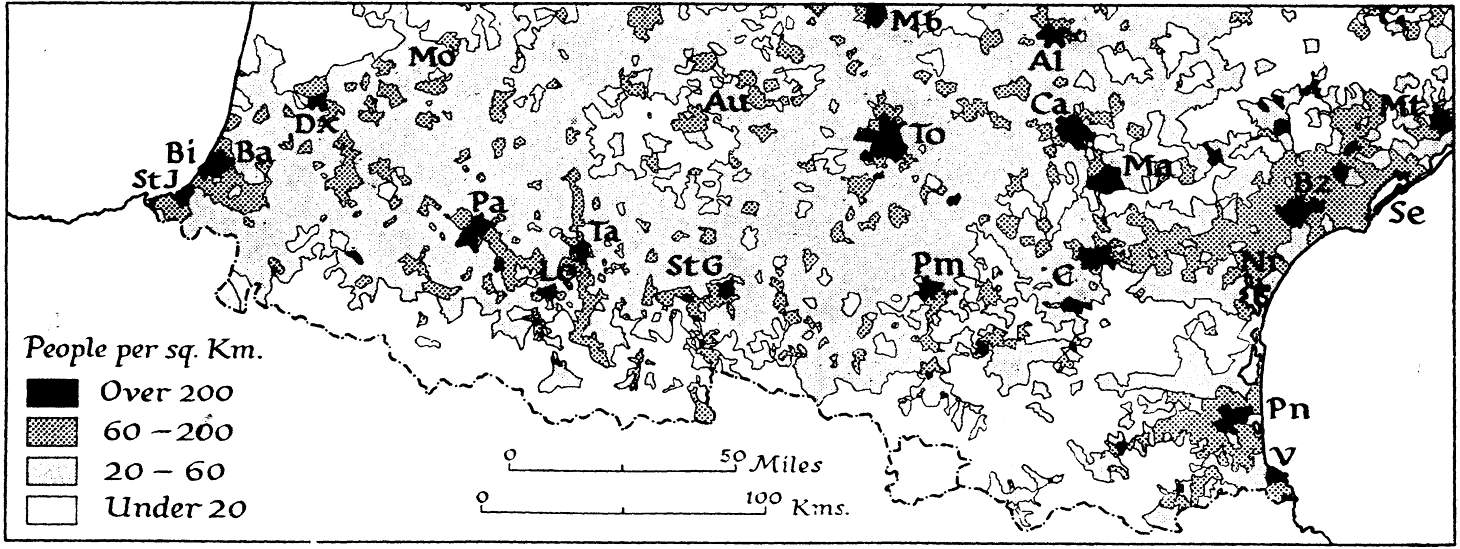


Fig. 8. The distribution of population in the Pyrenees region, 1931

Based on the *Atlas de France*, Plate 74 (Paris, n.d.).

Al, Albi; Au, Auch; Ba, Bayonne; Bi, Biarritz; Bz, Béziers; Ca, Castres; C, Carcassonne; Dx, Dax; Lo, Lourdes; Mb, Montauban; Ma, Mazamet; Mo, Mont-de-Marsan; Mt, Montpellier; Nr, Narbonne; Pa, Pau; Pm, Pamiers; Pn, Perpignan; Se, Sète; StG, St Gaudens; StJ, St Jean-de-Luz; Ta, Tarbes; To, Toulouse; V, Port-Vendres.

Lavelanet. The population of the Pyrenean region, neglecting the towns of Bayonne and Biarritz at one end and the Perpignan agricultural region at the other, is approximately 900,000.

Thus between the mountains and the plain there is a zone of many small districts in which the density of population is higher than that of the purely agricultural lowland. It is not a belt of population but only a series of units. Each of these takes up a general trend from north to south, at right angles to the Pyrenees, an arrangement which arises from the absence of any big longitudinal valleys such as are found in the Alps; only in the upper Ariège for a short distance is there any great population in a longitudinal valley. The communities in each valley have therefore had more contact with the plain than with each other. The little towns which grew up at the meeting of valley and lowland remained small for this reason—Meaulon, Oloron, Lourdes (11,000), and Foix. Those farther out from the mountains could serve several areas, and thus grew to be larger; such are Pau (40,000), Tarbes (35,000), Pamiers (14,000), and even Toulouse. In the extreme west stand the port of Bayonne (31,000), the resort of Biarritz (21,000), and Anglet (11,000).

(8) *The Rhône-Saône Valley* (Fig. 9)

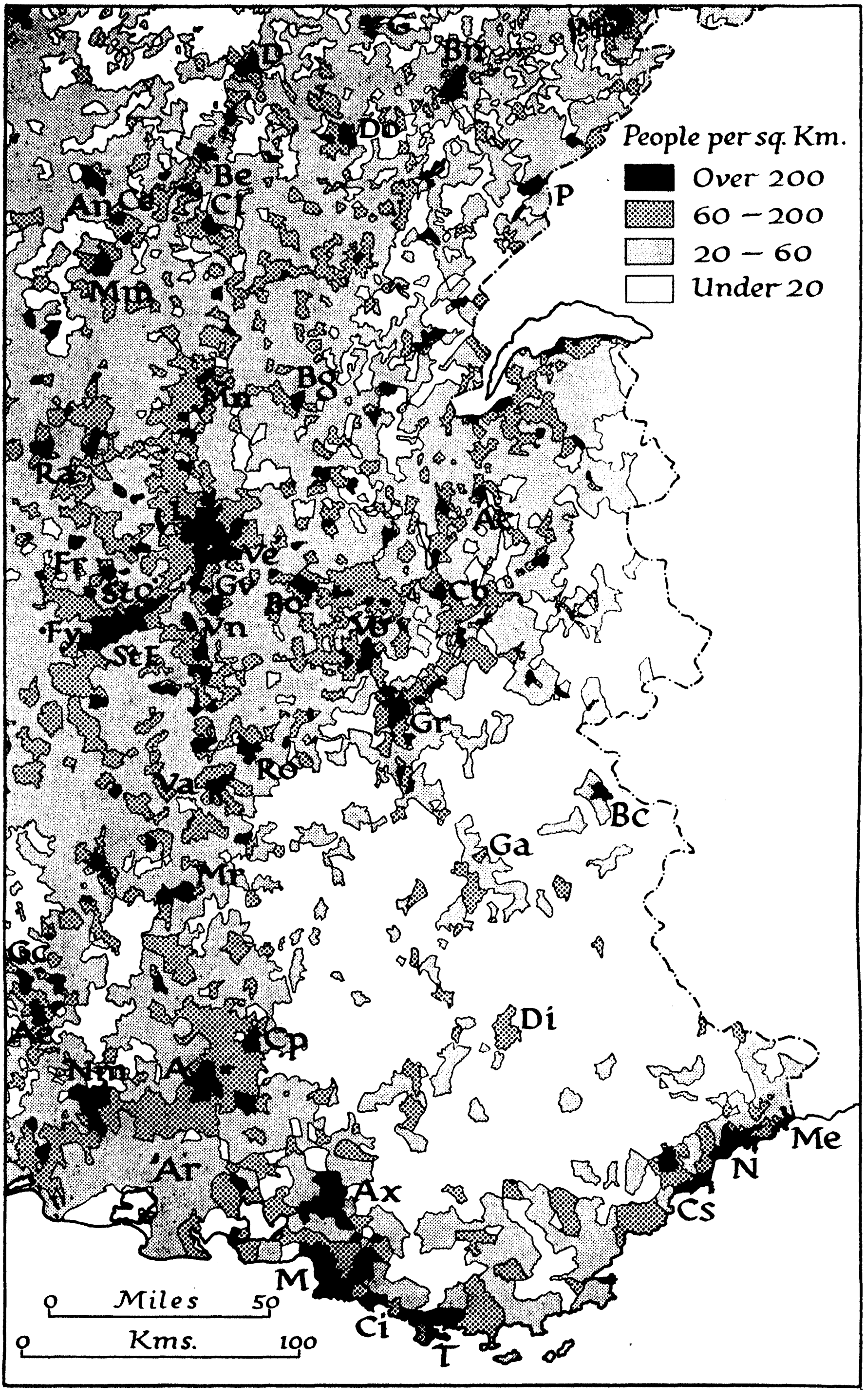
In the northern part of the Saône valley the vine was formerly important, and the density of population is high for an agricultural district. South of Chalon-sur-Saône the density increases, and many villages lie on the valley floor, while to the west, along the foot of the Côte d'Or and the Beaujolais, viticulture supports a belt of dense population, especially around Beaune. Southwards beyond Bourg, a pronounced area of sparser settlement appears in the boulder clay covered plateau of Dombes. Urban centres in the north are Besançon (65,000) and Dijon (96,000), in the centre Chalon-sur-Saône (33,000), and in the south Bourg (25,000) and Mâcon (19,000). Nearby are the industrial towns in the extreme north-east of the Central Massif: Montçeau-les-Mines (27,000) and the armaments centre of Le Creusot, the latter forming part of an agglomeration with 40,000 inhabitants.

Lyons, the third city of France, has spread widely beyond its original sites, the hill of Fourvière and the long and narrow strip between the Rhône and Saône, and in recent decades the greatest growth has been to the south-east where Villeurbanne (81,000) is the chief manufacturing suburb. The old and the new parts of the urban area were about equal in population in 1896, when the total population was 497,000. In 1936 the figure was 570,000, although if all contiguous urban districts be added the total amounts to nearly 800,000. Sixty kilometres to the south-west, just within the Loire Basin, lies St Etienne, with its engineering, hardware, and silk industries; its population is 190,000. To the west lie three tributary towns—Firminy (20,000), Le Chambon-Feugerolles (15,000) and La Ricamarie (10,000); to the east, at intervals along the valley leading to the Rhône and the confluence town of Givors (13,000), is a succession of manufacturing centres, especially St Chamond (15,000) and Rive de Gier (14,000), the population of this long string of settlements being 348,000. The St Etienne district is structurally part of the Central Massif, and its economic development has been largely independent of that of Lyons, but its power demands bring it increasingly within the Alpine hydro-electric system.

From Lyons to the Camargue delta, the Rhône valley is comparatively densely populated, though in irregular fashion. At intervals occur the towns of Vienne (25,000), Valence (36,000), Montélimar (15,000), Avignon (59,000), and Tarascon-Beaucaire (15,000). An intensive and varied agriculture, helped by irrigation, is the basis of this population. The Camargue is an extensive area, by comparison only moderately populated, and much of it is very sparsely settled. The damp and heavy soil yields to agriculture after much reclamation; in the smaller region of the Crau, composed of ancient alluvium, shortage of water demands irrigation. In limited parts of these two districts reclamation in the past half-century has allowed the development of an extensive fruit and market-garden industry, and there has been considerable immigration. Arles (29,000) is a centre for the marketing of agricultural produce.

(9) *The Jura* (Fig. 9)

Eastwards of the plain of Burgundy, the land rises to the high limestone Plateau of the Jura, in which exposures of marl and morainic deposits support a larger population than might have been expected; only one town, Pontarlier (13,000), exists to serve this region. The mountain Jura, however, is two or three times as densely populated as the plateau: between the forest-clad *monts* or anticlines, the valleys, though elevated, are well peopled. Stock rearing and forestry are supplemented by a variety of domestic industries and by watchmaking, which are helped by the hydro-electric power available. The southern Jura is more broken and shows considerable contrasts in population density between upland and valley. The uplands support active settlements depending on resources of high meadow and


People per sq. Km.
Over 200
60 – 200
20 – 60
Under 20
G
Mb
D
Bn
Db
Be
An
Ce
Cf
P
Mm
Bg
Mn
Ra
L
Ac
Ve
Fr
Sto
Gv
Bo
Cb
Fy
Vn
Vo
StE
Gr
Ro
Va
Bc
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0 Miles 50
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Fig. 9

timber; in the valleys, however, such as the basins of Belley and Saint-Gieux, agriculture and fruit growing support a more considerable population, and industry is developing upon the basis of ample supplies of hydro-electric power, both near and more distant. Here industry is more concentrated than in the northern and central Jura. The chief towns of the southern Jura are St Claude (11,000) and Oyonnax (10,000), with Lons-le-Saunier (14,000) at the western foot of the plateau.

(10) *The Alps* (Fig. 9)

The Alpine region falls into two main sections. In the north the basins of the Isère and Rhône have an irregularly distributed but by no means inconsiderable population: the two innermost departments, Savoie and Haute-Savoie, have a combined population of 499,000, including only two towns above 20,000. The density on land which can be used in any way, not counting towns of over 3,000, is 40 per sq. km. The southern Alps, however, largely comprising the basin of the Durance, form a thinly populated region: the two innermost departments of Hautes- and Basses-Alpes contain only 175,000 inhabitants, and the density on exploitable land is 17 per sq. km.

The northern region contains a number of valleys in which population congregates, more especially in the west, the line of division being the longitudinal valley running south-west for 200 km. from Mont Blanc to Dévoluy and including the Grésivaudan. There has been a steady movement from the higher settlements into this main valley. In this, and in those valleys leading westwards to the Rhône, the traditional foundations of life have been stock raising with some agriculture, helped by local industries such as the glove manufacture around Grenoble. The maximum height at which agriculture is practised is 2,000 m. Eastwards to the frontier pastoralism becomes more and more the basis of existence, and transhumance, or seasonal

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Fig. 9. The distribution of population in south-eastern France, 1931

Based on the *Atlas de France*, Plate 75 (Paris, n.d.).

A, Avignon; Ac, Annécy; Ae, Alès; An, Autun; Ar, Arles; Ax, Aix; Bc, Briançon; Be, Beaune; Bg, Bourg; Bn, Besançon; Bo, Bourgoin; Cs, Cannes; Cb, Chambéry; Ce, Le Creusot; Ci, La Ciotat; Cl, Chalon-sur-Saône; Cp, Carpentras; D, Dijon; Di, Digne; Do, Dôle; Fr, Feurs; Fy, Firminy; G, Gray; Ga, Gap; Gc, La Grand Combe; Gr, Grenoble; Gv, Givors; L, Lyons; M, Marseilles; Me, Mentone; Mm, Montçeau-les-Mines; Mn, Mâcon; Mo, Montbéliard; Mr, Montélimar; N, Nice; Nm, Nîmes; P, Pontarlier; Ra, Roanne; Ro, Romans; StC, St Chamond; StE, St Etienne; T, Toulon; Va, Valence; Ve, Villeurbanne; Vn, Vienne; Vo, Voiron.

migration, more important as a means of extracting every possible gain from the restricted area of soil. Transhumance is particularly well developed in the Tarentaise and Maurienne, and is accompanied by the usual temporary dwellings or chalets. For centuries there has been a winter migration of part of the population to other regions, even as far as Paris; it still takes place, but in the last 50 years has given way more and more to permanent migration.

There is ample choice of sites for settlement open to the small population of the Alpine region. Many villages are found on the alluvial cones of tributary valleys, some being as high as 200 m. above the main valley. Some villages and hamlets lie on the lower benches or glacial shelves; on the higher ones above 1,000 m. or so are found only the temporary dwellings. Here and there a bar crossing a ravine is the site of a village, while at confluences larger villages and small towns are found. It is natural that settlement should take advantage of topographical details to secure a maximum of sunlight, and where valleys trend east and west the northern slope almost always carries most of the dwellings.

The extensive southern region of the Alps is very different. A drier climate and wide extent of bare limestone limit the possibilities of human occupation. The region is the most sparsely populated of the Alps, the least settlement being found in the Pre-Alps. A series of small agricultural districts, sometimes discontinuous, follows the Durance and the lower valleys of its tributaries. The normal decline of density with increase of height is reversed here and the interior valleys are more inhabited than the lower. Gap (13,000) is the largest town in the southern Alpine region; Briançon and Digne have populations below 5,000. Migration from the southern zone of the Alps has been long continued.

The various factors which in the past three-quarters of a century helped to enlarge the foundations of life in the French Alps have all operated with greater effect in the northern region. Tourist traffic and railway development have been more attracted to the north. Domestic industries have been more easily retained and expanded there owing to the greater abundance of accessible hydro-electric power. The latter resource has, of course, resulted in the appearance of large-scale chemical and metallurgical plants, such as Jumieux, Calypso and Ugines, and if these have not resulted in any very direct increase in employment for the people of the region, they have increased the demand for locally produced food supplies. These modern developments are at the base of the steady growth of Grenoble in recent years

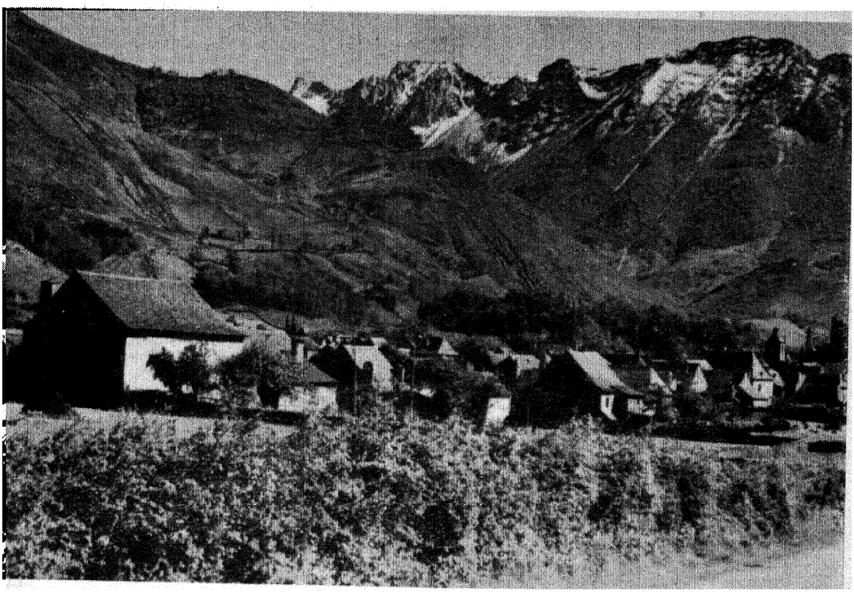

Plate 6. Bedous (Basses-Pyrénées)

The larger Pyrenean valleys contain villages at frequent intervals. Bedous lies in the Gave d'Aspe, which leads to the Somport pass.

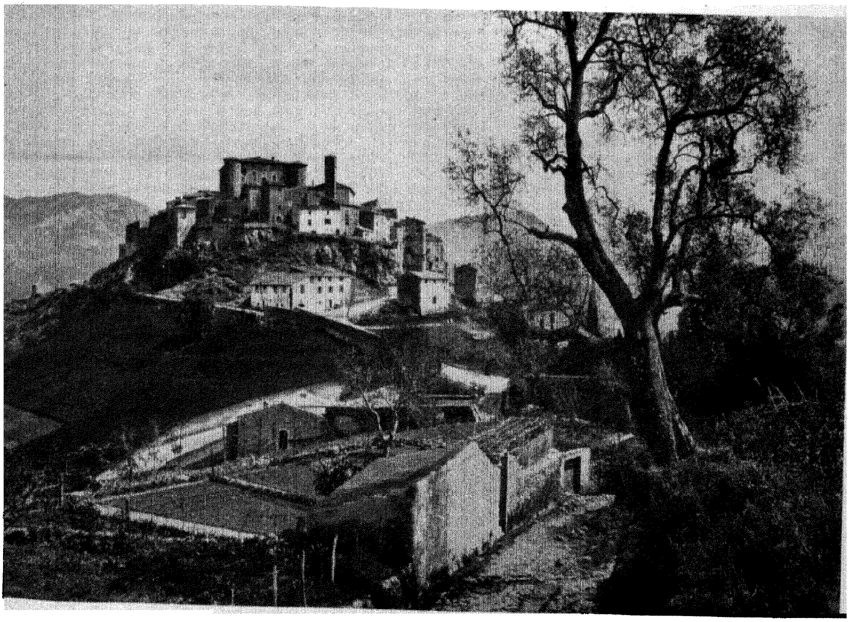

Plate 7. Carros (Alpes-Maritimes)

There are numerous hill-top villages such as Carros in Mediterranean France; the sites were selected for their defensive qualities. Carros is on a limestone crag in the Var valley, north-west of Nice.

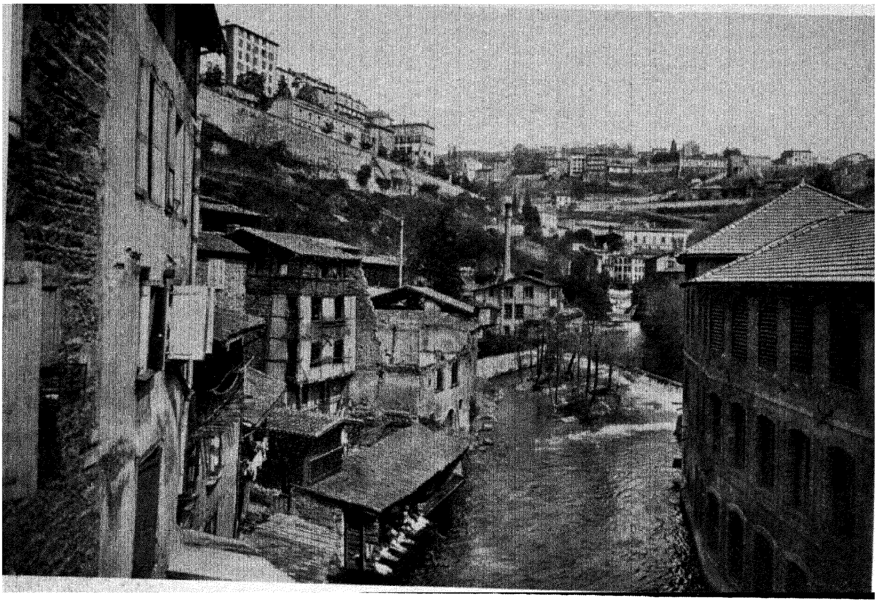

Plate 8. Thiers (Puy-de-Dôme)

The town is built in terraces within a meander of the deeply incised river Durolle. It has many ancient stone and timber houses dating from the fifteenth and sixteenth centuries, and has a highly specialized cutlery industry based originally upon local water power.

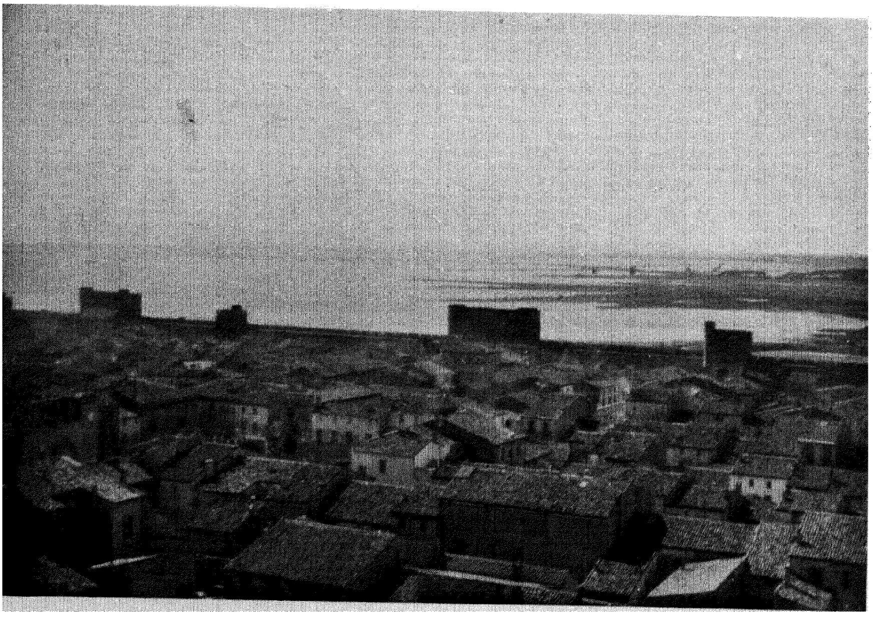

Plate 9. Aigues-Mortes in the Rhône delta

This extraordinary town lies on the edge of the Etang de la Ville, some 6 km. from the Mediterranean. It is completely surrounded by rectangular ramparts built in the thirteenth century, and is one of the most striking examples of military architecture. See vol. II, p. 52 of this Handbook.

(96,000). In the northern part of the Alpine region, Chambéry (28,000) is the largest town, lying on a main railway from the Rhône valley to Turin. Annécy (23,000), Aix-les-Bains (13,000), and Thonon (12,000) are resorts.

(11) *The Mediterranean Coastland* (Figs. 7, 8, 9)

Languedoc. This region is characterized by two features: the considerable but irregular belt of dense agricultural population and the number of towns of fair size.

Between the Central Massif and the sea can be found very great contrasts in density. In places there are high and rocky hills with a great extent of limestone, and frequent areas of *garrigue.* Parts of the *garrigue* country around Montpellier are among the most thinly inhabited districts in France, even more than the Alps or the Causses. Where agriculture is possible, however, it can be carried on intensively, and the department of l'Hérault, although it contains no great city, has a population density of 83 per sq. km., a figure higher than the density in Normandy. Viticulture and fruit and vegetable growing, largely on a commercial basis, are the foundation for this rural population. Towards the south the mountain range of the Corbières causes a thinning out of population, but the figure increases again, and in the district behind Perpignan is comparable with the main belt at the foot of the Massif. It is important to notice that this dense population of Languedoc is not a coastal one, though it lies very near to the coast. The sea has exercised a minor effect, and along the étangs or lagoons fishing or mercantile population is very restricted.

Demographically, this territory is most interesting, for it has shown much less of the rural decline so common elsewhere. The amount of decline is actually exaggerated a little by the census classification, for where a commune has increased so as to raise the population of the chief settlement above 2,000 it ceases to be classified as rural, though in a number of instances where such an increase has occurred the agricultural activity of the commune has continued. There has been a considerable immigration of foreigners into this territory, much more than in the Aquitaine Basin; they are mostly Spaniards, of whom there were over 80,000 in 1932. Yet the French population has increased more rapidly in the past 50 years than in France as a whole, for, although the birth-rate is not much above that in the Aquitaine Basin, there has been for many years a considerable immigration from other parts of France. Through the agricultural improvements and advance towards intensive and commercial farming in this region, therefore, a considerable re-distribution of rural population has been taking place.

In the Languedoc agricultural zone there are five towns which have all shared in the expansion of the population as a whole, but not by draining the countryside. While in France from 1872 to 1926 the rural population fell from 69 to 51 %, in the department of l'Hérault the fall was only half as great. Nîmes has a population of 94,000, and has developed industries owing to its proximity to the Alès coalfield. Nearby is the university city of Montpellier (91,000); Béziers (73,000) carries on textile industries; Sète (37,000), the recently revived port, has a petroleum refinery nearby; Narbonne remains comparatively small with 31,000 inhabitants. Four other towns lie away from the main belt of population: Alès (41,000) and La Grand-Combe (12,000), on the small coalfield at the edge of the Central Massif, are small industrial centres; Perpignan (72,000) is the centre of the Roussillon agricultural region, between the Corbières and the Pyrenees; Carcassonne (33,000), on the route to Aquitaine, is at the end of the tongue of dense agricultural population extending inland from the Mediterranean.

Provence. Along the coast of Provence lie very limited areas of agricultural population, often close to barren mountains, and the massifs of the Maures and Esterel are among the most thinly peopled regions in France. On the road from Aix, eastwards to Antibes, only a few isolated farms can be seen in 25 km. Cities and towns, however, have developed to a marked degree in recent decades. Toulon (150,000) and La Seyne (27,000), across the roadstead, take a modest place in this expansion. Among the resorts along the Riviera coast, Nice had become, by 1936, the fifth largest city in France with a population of 242,000 (or 272,000 if adjoining resorts be included). In the same year the group of smaller resorts from Cannes to Antibes had a combined population of 102,000. The most interesting feature of expansion in this region, however, has been the growth of Marseilles; at the beginning of this century it had a population of 494,000, while the total of 806,000 in 1931 increased to 914,000 in 1936, mainly through a steady immigration of Midi peasants and of foreigners. The ancient university city of Aix, not far to the north, has a population of only 42,000. Like Aubagne (14,000), east of Marseilles, it engages in some industry. Between Marseilles and Toulon lies La Ciotat (13,000), where there is an important shipbuilding yard.

GROWTH OF POPULATION

The population of France has grown slowly compared with the populations of other countries. In 1800, with over 27 million inhabitants, it was the most populous country in Europe, outside Russia, a position which it held until about 1850. After that date the rate of increase slowed down, and the population of France was soon to be exceeded by that of Germany (i.e. the states which were shortly to form the German Empire). From 1870 to 1936 the total increase in France was only 4·9 millions; in Germany it was 28 millions, in Italy 16, and in the United Kingdom 19·6. This slow increase is the crux of the population problem of France.

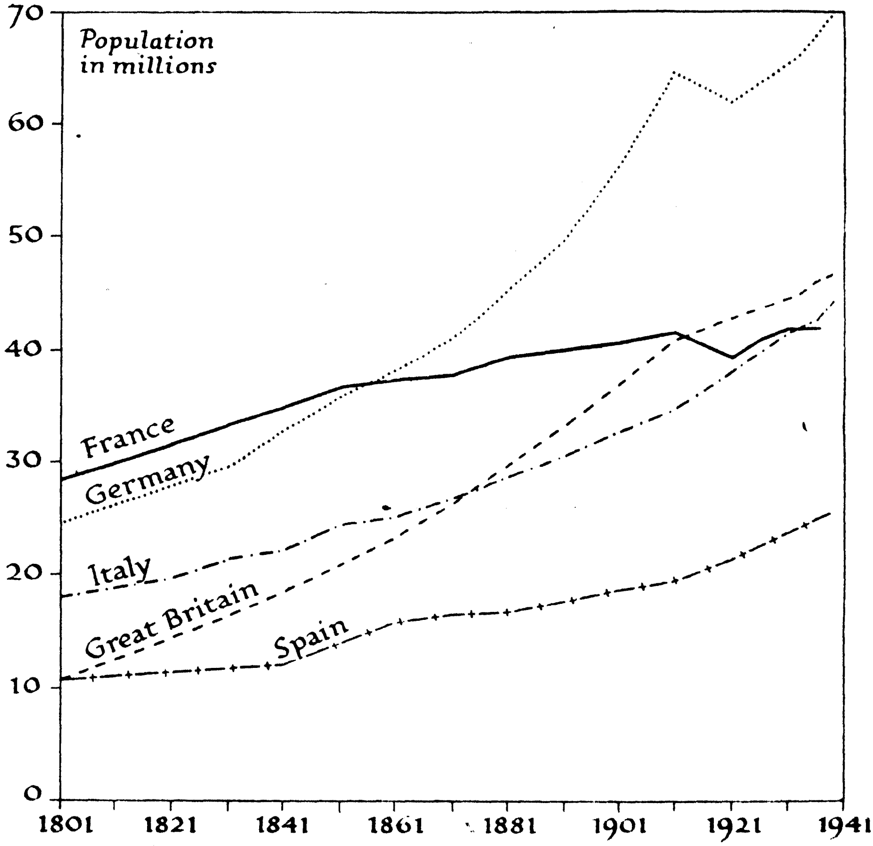

Fig. 10. The growth of population in France and neighbouring countries, 1801–1939. (The growth shown after 1936 is based upon estimates.)

The position was made worse by the effects of the war of 1914–18, for the French losses in men were proportionately greater than those of the other belligerents in western Europe. Death casualties of France (European troops) were 1,320,000, of Germany 1,827,000, of the United Kingdom 765,000.† These losses were equivalent to 1 in 31 of the total population for France, 1 in 36 for Germany, and 1 in 59 for the United Kingdom. It must be remembered that the war deaths occurred almost entirely among young and middle-aged men, and amounted to 10·5% of these age groups in France, 9·8% in Germany and 5·1% in the United Kingdom. The natural increase of the population was further affected by the absence of so many men in the armies. It has been estimated that owing to the war the number of births in France was 2,400,000 below the normal number.

The Balance of Births and Deaths

Unlike most other European countries, France has known several years when the number of deaths exceeded the number of births. Between 1854 and 1919 this occurred in seventeen years, and was due mainly to war or epidemic. In the nineteen-year period 1920–38, however, an excess of deaths occurred in five years—1929, 1935–8—and has been due each time to the decline in the number of births.

Excess of Births over Deaths, 1921–38 (*in thousands*); *a deficit is shown by a minus sign*

Annual average	France	Germany*	United Kingdom
1921–25	117·2	555·9	352·4
1926–30	59·8	428·7	221·6
1931–35	32	355·6	150·8
1933	18	233	122
1934	43	473	154
1935	-19	472	150
1936	-12	483	139
1937	-12	484	126
1938	-35	546	176

* Including the Saar territory.

From (1) *Annuaire Statistique, 1938* (*Resumé Retrospectif*), pp. 11–13 (Paris, 1939); (2) *Statistical Year-book of the League of Nations, 1938–9*, pp. 39–41 (Geneva, 1939).

It should be remembered that, in those years in which there has been an excess of births over deaths in France, a high proportion are attributable to the foreign population. During the four years 1925–9, for example, when there was a total excess of births of 240,000, the foreign population was responsible for 130,000.

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† The total for the British Empire was 1,020,000.

Immigration

In recent years the population of France, with its very low rate of natural increase, has been affected to a considerable extent by the movement of foreigners into the country (see Appendix I).

Natural Increase and Migration, 1922–38, *in thousands*

	Births	Deaths	Excess of births over deaths	Net immigration
1922	760	688	+ 72	+131·3
1923	762	666	+ 95	+202·9
1924	754	679	+ 75	+217·6
1925	770	708	+ 62	+121·9
1926	767	713	+ 53	+113·4
1927	744	676	+ 66	- 25·6
1928	749	674	+ 70	+ 44·0
1929	730	739	- 9	+140·4
1930	750	649	+101	+177·8
1931	734	679	+ 55	+ 9·3
1932	722	660	+ 63	- 39·0
1933	679	660	+ 18	+ 25·6
1934	678	634	+ 43	+ 31·5
1935	641	658	- 19	- 10·7
1936	631	642	- 12	- 5·4
1937	617	629	- 12	+ 47·4
1938	612	647	- 35	+ 25·6
			+686	+ 1,208·0

From *Annuaire Statistique, 1938 (Resumé Retrospectif)*, Table 1, p. 13 (Paris, 1939).

Thus over this considerable period from 1922 to 1938, the increase in population from immigration exceeded the natural increase by 522,000. The figure should probably be increased to allow for unrecorded immigration: one estimate suggests that during 1920–30 there were 440,000–660,000 unrecorded immigrants, of whom rather less than 70% remained in France—perhaps over 300,000. It will be observed that the totals of immigration have not followed a regular course, for two pronounced maxima can be distinguished. Of the total net immigration of 1,208,000 during 1922–38, 787,000 were accounted for in the period of reconstruction and comparative prosperity which followed the war, and 318,000 in the two years of prosperity, 1929–30, which in France preceded the impact of the world economic depression. For the remaining eight years, therefore, net immigration amounted to only 103,000.

It is clear that immigration has contributed materially to the growth of population in France, whatever allowance may be made for the effect of variations in trade prosperity. In detail, the contribution made by immigration to population increase over a long period has been estimated as follows:

	Percentage of increase due to net immigration		Percentage of increase due to net immigration
1851–61	13	1891–96	63
1861–66	20	1896–1901	30
1872–76	10	1901–06	43
1876–81	23	1906–11	60
1881–86	27	1921–26	74
1886–91	80	1926–31	76

From J. J. Spengler, *France Faces Depopulation*, pp. 195–6 (Durham, North Carolina, 1938).

Before the war of 1914–18, therefore, in one period of ten years (1886–96) the percentage of increase contributed by immigration was very large.

When absolute figures are examined over a long period, the effects of immigration, compared with the effects of natural increase, are at first sight startling. During the period 1850–1930, for example, net immigration supplied 3·5 millions, against only 2·0 millions from natural increase. During the shorter period 1851–1911, however, immigration contributed over 1 million, compared with 3·9 millions arising from the excess of births over deaths. Much of the discrepancy arises from the effects of the war of 1914–18. In the six years 1914–19, the reduction in the number of births combined with the increases in the number of deaths to produce a total excess of deaths over births of 2,868,000. As there is every reason to believe that there would normally have been, during those years, a total excess of births over deaths, the net loss to the French population exceeded 3 millions. The gain resulting from immigration may therefore be regarded as offsetting, broadly speaking, the losses which must be ascribed to the war of 1914–18. Thus when the effect of immigration on the growth of the population is considered, it must be remembered that long-period totals of natural increase conceal the exceptional conditions of 1914–19.

Age Groups

The age composition of the population is a product of its past and has a vital bearing upon its future. In general the population of France has not yet 'aged' to the extent sometimes thought, although the tendency is making itself visible. The proportion of children under 1 year in the population in 1931 was practically the same as the figure for 1851. The 1–19 group has declined and the older age groups have increased their percentages.

Population by Quinquennial Age Groups, as a percentage of Total Population. Based on estimates

	France 1936	England and Wales 1937	Germany* 1937	Netherlands 1937	Poland 1938
0–4	8·2	6·8	8·1	9·5	10·3
5–9	8·4	7·2	7·2	9·6	10·9
10–14	8·6	7·8	8·0	9·5	11·4
15–19	5·6	8·1	7·8	9·2	9·7
20–24	7·3	7·9	6·9	8·5	7·0
25–29	8·0	8·4	9·1	8·3	9·7
30–34	8·0	8·2	8·9	7·7	8·7
35–39	7·5	7·6	8·3	6·9	7·2
40–44	6·4	6·8	6·9	6·2	5·7
45–49	6·1	6·4	6·1	5·3	4·5
50–54	5·8	6·0	5·6	4·8	3·9
55–59	5·5	5·5	5·0	4·2	3·3
60–64	4·8	4·7	4·5	3·6	7·7
65 +	9·8	8·5	7·6	6·7	
	100·0	100·0	100·0	100·0	100·0

* Including the Saar territory.

From *Statistical Year-book of the League of Nations, 1938–9*, pp. 26–30 (Geneva, 1939).

It is clear that the age composition of the French population is broadly similar to that of Germany and of England and Wales, and that it differs from the age composition in Poland and the Netherlands in having a smaller proportion of children; it has a much higher proportion of the older ages than occurs in Poland. Among the groups of young and middle ages, the French population is appreciably deficient compared with all countries cited. The position may be summarized as follows:

Population by Big Age Groups

	France 1936	England and Wales 1937	Germany 1937	Netherlands 1937	Poland 1937
Totals: 0–14	25·2	21·8	23·3	28·6	32·6
15–49	48·9	53·4	54·0	52·1	51·5
50+	25·9	24·7	22·7	19·3	14·9
Women: 15–49	48·2	53·3	54·0	52·3	52·6

Of the total population men represent 48·3%; neglecting the foreigners in France, however, men represent only 47·3%.

Two consequences eventually result from an 'ageing' population: (*a*) An increase in the death-rate, for the higher death-rate of the older people will become increasingly important in its effect upon the total death-rate. It should be remembered that the rate at which the span of life can be lengthened is slowing down. (*b*) A decrease in the number of births—for the older generations, which are likely to produce fewer children, are now becoming relatively more numerous.

These must now be analysed separately, but whereas the death-rate is a comparatively simple conception which can be dismissed quickly, any account of the birth-rate and its relation to effective reproduction involves a more complicated argument. For this reason the death-rate is considered first, and the birth-rate and its relation to the future growth of population is considered afterwards.

Death-Rates

The crude death-rate in France has declined steadily from nearly 30 per thousand at the beginning of the last century to 15·4 in 1938. It is higher than would be expected, and exceeds the rates prevailing in the countries of north-western Europe and approaches more nearly the rates found in eastern Europe. Since 1801 it has, in every ten-year period, exceeded the rate in England and Wales, but it was not until 1901–10 that it came to exceed the rate in Germany.

Death-Rates, per 1,000 *inhabitants*

	1932	1933	1934	1935	1936	1937	1938
Yugo-Slavia	19·2	16·9	17·0	16·8	16·0	15·8	—
France	15·8	15·8	15·1	15·7	15·3	15·0	15·4
Poland	15·0	14·2	14·4	14·0	14·2	14·0	13·8
England and Wales	12·0	12·3	11·8	11·7	12·1	12·4	11·6
Germany	10·8	11·2	10·9	11·8	11·8	11·7	11·7
Netherlands	9·0	8·8	8·4	8·7	8·7	8·8	8·5

From *Statistical Year-book of the League of Nations, 1938–9*, p. 44 (Geneva, 1939). For a discussion of the causes of death see vol. II, pp. 244–9.

If France could reduce the death-rate to that of more favoured countries, a gain of 120,000 lives would be secured each year. Such a gain would have an appreciable effect upon the birth-rate, but would not greatly offset its low figure.

The causes are not easily specified; some authorities ascribe them to the proportion of old people in the population, but this factor can only be a minor effect on the situation: other authorities lay more stress on shortcomings in the administration of health services.

Infantile mortality is appreciably higher than in the neighbouring countries (see vol. II, p. 243), and the death-rate is also higher for young adult men. The table of mortality by age and sex shows that in France the disparity with Germany and England and Wales is very pronounced for the ages 30–40.

Mortality by Age and Sex: Specific Rates per 10,000 *Inhabitants of each Age Group*

	France 1935		France 1936		Germany 1936		England and Wales 1936		Netherlands 1936–37	
Age	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.
0–1	775	600	185	149	740	579	662	504	118	93
1–4	58	52			54	50	58	52		
5–9	20	18	18	17	22	20	21	18	12	10
10–14	14	15	13	13	15	13	13	11	9	8
15–19	29	28	29	29	21	17	20	19	15	13
20–24	45	39	40	35	32	25	29	26	20	16
25–29	48	43	47	39	32	28	29	27	19	19
30–34	61	43	60	41	35	32	31	38	23	23
35–39	80	50	80	48	45	38	42	35	27	30
40–44	99	60	103	60	58	47	56	44	37	38
45–49	129	79	125	75	80	65	85	62	54	52
50–54	175	107	172	105	115	91	134	90	84	80
55–59	240	145	229	139	175	138	196	129	130	125

The rates for infants under 1 year are based on 10,000 living births.

From *Statistical Year-book of the League of Nations, 1938–9*, pp. 46–8 (Geneva, 1939).

After allowances have been made for any possible effect of age structure, it appears to be inescapable that in France improvements in welfare and medical services have not succeeded in prolonging the span of life as much as in some other countries of Europe. The average expectation of life is a reflexion of this fact.

Expectation of Life at Birth, in years

		M.	F.
France:	1908–13	48·49	52·41
	1920–23	52·19	56·09
	1928–33	54·30	59·02
Germany:	1910–11	47·41	50·68
	1924–26	55·97	58·82
	1932–34	59·86	62·81
England and Wales:	1910–12	51·50	55·35
	1920–22	55·62	59·58
	1930–32	58·74	62·88

From *Statistical Year-book of the League of Nations, 1938–9*, pp. 52–4 (Geneva, 1939).

Birth-Rate, Fertility and Reproduction Rates

In France a good deal may yet be done to lengthen the span of life, until a figure comparable with that of some other countries is reached, but clearly the process cannot be continued indefinitely. It is the number and rate of births which are the more important factors for the future. Just as present numbers of a population and its age compositon are determined, not by the birth- and death-rates prevailing now, but by the rates which have prevailed during the lifetime of all the generations now living, so will the numbers and age composition of a population at the present time control to a large measure the population of future generations.

The Birth-Rate. The birth-rate, i.e. the number of live births compared with the number of inhabitants, has declined from 32 per 1,000 in 1801–10 to 14·6 in 1938. In the four years preceding 1938 it was lower than the rate in most countries of north-western Europe, and much lower than the birth-rate in eastern Europe.

Birth-Rate per 1,000 *Inhabitants*

	1932	1933	1934	1935	1936	1937	1938
Sweden	14·5	13·7	13·7	13·8	14·2	14·3	14·9
France	17·3	16·2	16·2	15·3	15·0	14·7	14·6
England and Wales	15·3	14·4	14·8	14·7	14·8	14·9	15·1
Belgium	17·7	16·6	16·0	15·4	15·2	15·3	15·6
Germany	15·1	14·7	18·0	19·0	19·0	18·8	19·7
Netherlands	22·0	20·8	20·7	20·2	20·2	19·8	20·6
Poland*	28·9	26·5	26·6	26·1	26·2	24·9	24·4

* Figures in part approximate.

From *Statistical Year-book of the League of Nations, 1938–9*, p. 43 (Geneva, 1939).

Authorities differ in their estimate of the causes of the lowness of the birth-rate in France: some attach a certain importance to the age composition of the population, in that there is a relatively higher proportion of old people who cannot effect natural increase. The percentage of the population formed by women of child-bearing age, however, has not been less favourable to natality than in many other countries of Europe, and a great part of the lowness of the birth-rate must be ascribed to the decline in fertility of women of child-bearing age. It appears that there is a tendency to diminish births at an earlier age in France than in other countries. In the number of births per 1,000 women in the lower age groups of the child-bearing period, France holds a fairly high place, but as the higher age groups of the period are reached the number drops considerably. This tendency is associated, not with an increase in childlessness, but with a decline in the size of the family. The number of surviving children per family is now below 2.

Fertility. The crude birth-rate merely expresses the number of births per thousand of the total population irrespective of age and sex. Neither this rate nor the balance between it and the death-rate is a true measure of the capacity of a population for further increase. A population may be preparing for decline while it is actually increasing in numbers, for the capacity of a population for further increase depends upon its fertility and its mortality in different age groups below 50. The fertility of a population clearly depends upon the number of women between 15 and 50—the reproductive period. But since the younger women have a higher fertility than older women, the composition of the population by age, especially the age of its women, is an important factor. The figures for *total fertility* show how many children would be born on an average to 1,000 women passing through the child-bearing age (i.e. between the ages of 15 and 50), assuming that current rates of fertility at all ages remain unchanged, and that none of the women in question die during that period. The figures are obtained by adding together the numbers of children born to every thousand women during each year of age.

Total Fertility

France:	1935	2,045	England and Wales·	1931	1,920
	1936	2,045	Netherlands:	1936	2,591
Germany:	1934	2,032		1937	2,543
	1936*	2,212			

* Data uncertain.

From *Statistical Year-book of the League of Nations, 1938–9*, pp. 60–1 (Geneva, 1939).

The figure for France means that, according to the fertility rates in 1936, a thousand French women would give birth to 2,045 children during their reproductive years, assuming that none of the women die before they reach 50. But since the number includes both boys and girls it is not a measure of the extent to which the population is equipping itself for reproduction. This is expressed by the number of girls born to every woman during the child-bearing years, since these will be the potential mothers of the future. In France this figure, which is called the gross reproduction rate, averaged 1·004 for the years 1935–6. This is to say, at the current rate of reproduction the number of women will just be maintained, provided that all these girls live through their childhood and reproductive years.

Net Reproduction Rate. But some of the girls will die before they reach the child-bearing age and some will not live through the reproductive period. The effective reproduction is thus represented by a figure which allows for such losses by death among females between birth and the age of 50 years. This figure is known as the *net reproduction rate.* When this correction is made, it is found that in France, according to the fertility and mortality rates of 1936, every thousand women will be replaced, not by 1,004 girls, but by 880 girls. That is to say, a thousand mothers were replaced by only 880 potential mothers; this represents a net reproduction rate of 0·880. The net reproduction rate is thus an indication of the extent to which a generation is likely to reproduce itself according to current rates of fertility and mortality. It shows the probable ratio between female births in two successive generations, and indicates whether the population is likely to increase or decrease. A net reproduction rate of 1·0, if maintained, means that the population is likely to remain constant provided that fertility and mortality do not change.

In France the net reproduction rate has remained below 1·0 for the greater part of this century:

Net Reproduction Rates

1908–13	0·930	1935	0·866
1920–23	0·977	1936	0·88
1925–27	0·929	1937	0·87
1928–33	0·905		

From *Statistical Year-book of the League of Nations, 1938–9*, p. 62 (Geneva, 1939).

At the present rate, therefore, the population of France is not reproducing itself. In this it is not alone in Europe, and in several countries a similar position exists; in some, even the net reproduction rate is lower, and therefore the rate of decline is likely to be greater than in France.

Net Reproduction Rates

Poland:	1931–2	1·25	France:	1935	0·866
	1934	1·11		1937	0·87
Italy:	1931	1·209	Belgium:	1936	0·831
	1935–7	1·128	England and Wales:	1935	0·764
Netherlands:	1930–1	1·28		1937	0·782
	1937	1·119	Sweden:	1935	0·729
Germany:	1931	0·748		1936	0·756
	1933	0·698			
	1935	0·906			
	1936	0·934			
	1938*	0·945			

* Official figure, arrived at by a method somewhat different from the method employed to determine the figures for the preceding years.

From *Statistical Year-book of the League of Nations, 1938–9*, p. 62 (Geneva, 1939).

Future Trends

It appears that if fertility and mortality remain unchanged, the population of France in 1985 may be expected to amount to only 34 millions. If fertility and mortality diminish at the rate of diminution now prevailing, the population would be only 29 millions. It must be remembered that in recent years the increase in the population of France has been due to the greater relative number of children born to foreigners resident in the country. A continuation of the present position would mean that, apart from any changes in the numbers of foreigners in France, the younger generation would include an appreciably increasing proportion of children of foreign parents (see Appendix I). The death-rate is higher than might be expected, and to this extent is perhaps capable of reduction. On the side of the birth-rate the position is largely an inheritance of the fact that France is the most advanced of European countries in the history of population limitation during the past century. This is not the place to speculate upon the causes of this trend; the special factors frequently cited as being relevant to the position of France are the desire of the peasant in a country where equal division of inheritances is the rule to limit the number of heirs to a landholding, and a fear of the future owing to the rise of a powerful Germany. The occurrence of this trend in many other European countries suggests that these special factors have not really influenced the position very much. The crux of the matter is the unique combination or intersection of historical and geographical situations—that the country about to show a decline in the rate of population growth before other countries should lie adjacent to a new united Germany, which had a population equal to that of France in 1860, and in which the retardation of growth was not to appear for a number of years.

REGIONAL VARIATIONS IN THE GROWTH OF POPULATION

Introduction

A short survey over the last 80 years will indicate the nature of the problems which arise from the unequal rates of increase or decline in France as a whole. During the first half of the nineteenth century all parts of France experienced an increase of population, although already, by 1851, three departments in Normandy and three in Aquitaine had begun to show a slight decrease. The years around 1851 are generally taken as the dividing line in the history of French population, for it was then that the development of coalfields, extension of the railways and the growth of the cities began to exert a decisive attraction upon the countryside.

From 1851 to 1881 thirty-seven departments showed a decline: not only in Normandy and Aquitaine, but in the Alps and the interior of eastern France—the Meuse, Champagne, and Burgundy. Between 1881 and 1911 these tendencies to decline were accentuated by the agricultural depression that began in the 'eighties. The areas of declining population now included sixty-three departments. Brittany and the Vendée began to show a decline, but in Normandy and Aquitaine the rate of decrease slowed up a little, although this was due largely to immigration; the departments of the Central Massif and Alpine regions continued to decline. The period 1911–26 was exceptional owing to the war of 1914–18, but even so there was no violent distortion of tendencies already at work.

By 1926 the main readjustment of disturbances brought about by the war of 1914–18 had probably been completed. Between 1926 and 1931 the total population of the country grew from 40,744,000 to 41,835,000, or by 1,091,000. Forty-six departments showed an increase, and forty-four a decline. The increases were chiefly in the following areas:

(1) the Paris region, where the department of Seine-et-Oise showed the enormous expansion of 48%;
(2) the industrial north, especially Pas-de-Calais;
(3) the departments bordering the north-east frontier;
(4) the coast of Provence, where a considerable increase took place;
(5) around Lyons, with a moderate increase;
(6) Languedoc;
(7) the Garonne valley, though the increase was very small.

A decline occurred over most of the Central Massif and the west, as well as in the inner Alpine departments and the upper Saône and upper Marne regions.

In the period 1931–6 the total population increased to 41,907,000, by the very small amount of 72,000: the actual increase of the French people had been considerable, 508,000, but was set off against a decline in the number of foreigners of 436,000. The number of departments increasing was now only thirty-six, and the number showing a decrease had risen by ten to fifty-four. The regions of increasing population were similar, although several changes had occurred. The rate of growth around Paris was slowing down; that around Marseilles was continuing. The decrease in some areas must be ascribed to economic depression; thus Pas-de-Calais now showed the maximum decrease of any department, and Meurthe-et-Moselle and Loire also declined contrary to their previous increases.

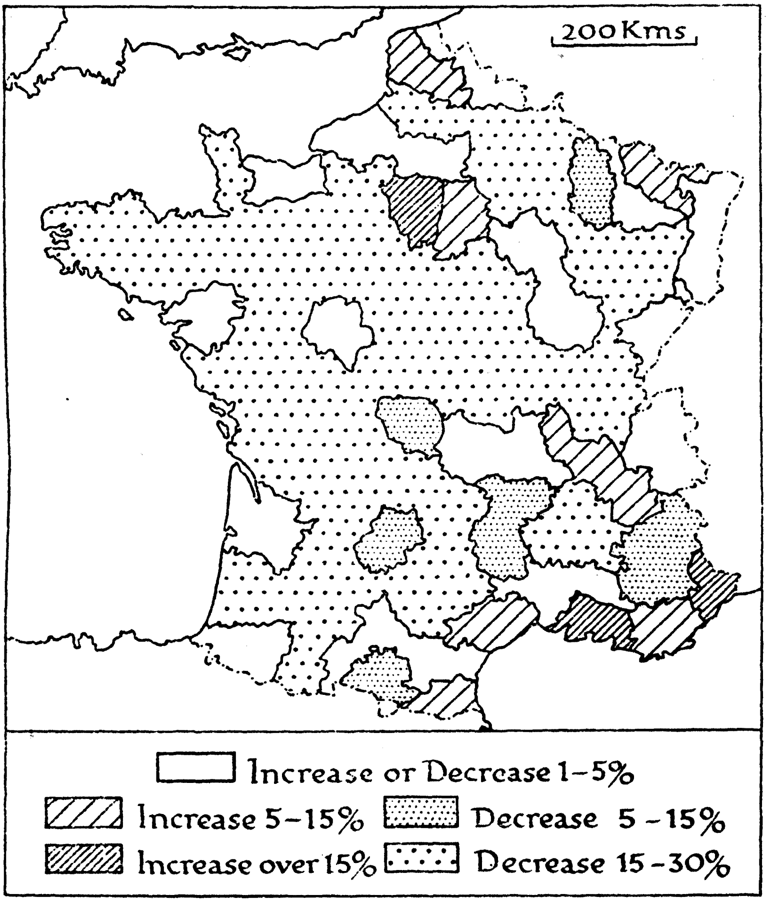


Fig. 11. Population changes, 1911–31

Based on the *Atlas de France*, Plate 77 (Paris, 1933).

To sum up: The growth of population in France since the Industrial Revolution resembled that over much of Europe—an increase in urban areas, a decrease in the countryside. But in France the rate of growth was less than in Germany, while the exodus from the countryside was particularly great. These two factors were causing increasing concern to all thinking Frenchmen.

Analysis of the Movements of Population

Three factors bring about inequalities in the growth of population within the country. They are variations in the balance of births and deaths, internal migration between different localities, and immigration from foreign countries.

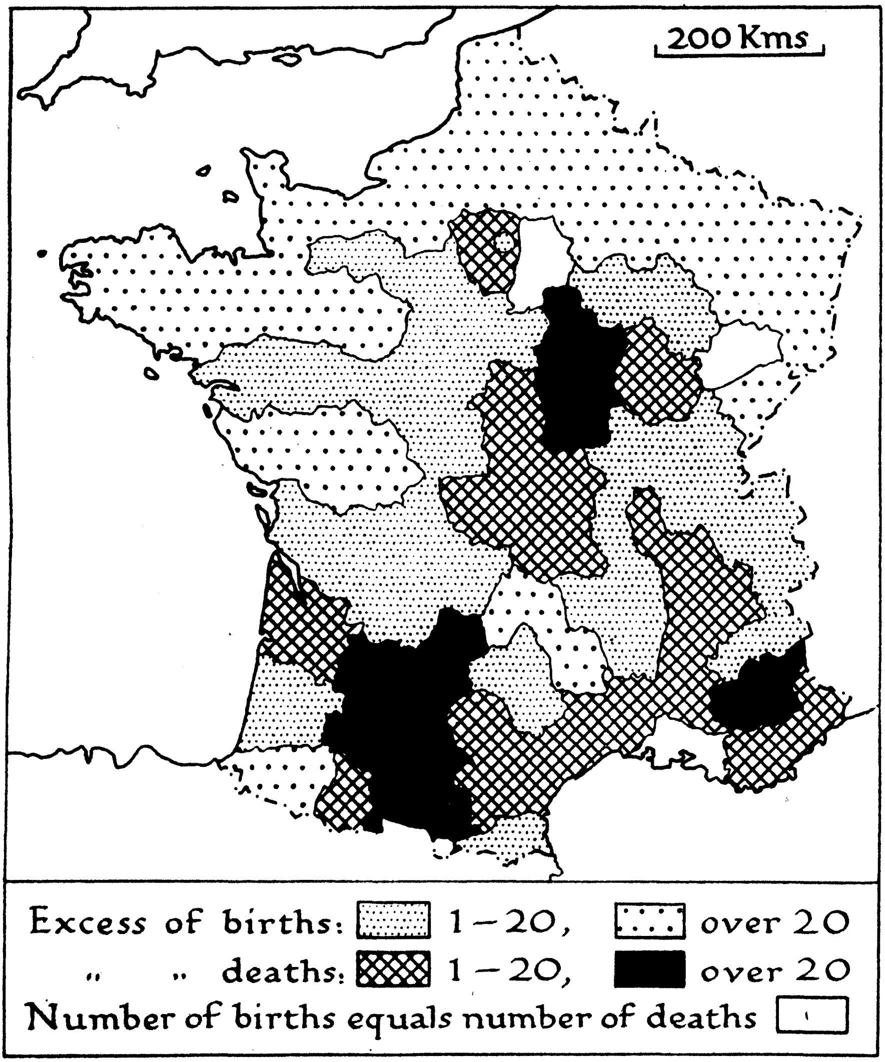

200 Kms
Excess of births: 1–20, over 20
" " deaths: 1–20, over 20
Number of births equals number of deaths

Fig. 12. The balance of births and deaths: excess or deficiency of births over deaths per 1,000 of the population, mean annual rate for the period 1922–31

Based on G. Mauco, 'Remarques sur le Mouvement de la Population en France depuis le début du XIXme siècle', *Annales de Géographie*, XLIV, 375 (Paris, 1935).

Births and Deaths: Geographical Distribution. Throughout France the local variations of the ratio between births and deaths show two principal features. The first, an excess of deaths in many of the larger cities, is not uncommon. The second is more peculiar to France; it is the unevenness of the ratio over rural areas. The main features shown in Fig. 12 relating to the years 1922–31 have been equally true for most of the period since 1851. Broadly speaking, in the northern half of the country, births exceed deaths, and in the southern half deaths exceed births, except in three small areas—the departments in the Vendée, in the southern part of the Central Massif, and in Basse Pyrénées (the Basque country). The most extreme deficiency is found in the Aquitaine Basin and in the departments of the Yonne, Nièvre and Allier. Here, the ratio between births and deaths is so adverse that, if it continued, the population would disappear within 200 years, and the maintenance of population therefore results from immigration.

Internal Migration. The movement of population between different districts within France has become greater since the middle of the last century. This mobility is true of many countries, but it seems to be particularly true of France. In 1851 the percentage of the population living in departments other than their native ones was 10; in 1926 it was 32. As might be expected, this percentage is much higher in cities. For the last 50 years two-thirds of the inhabitants of Paris have been born elsewhere; there are said to be 80,000 Parisians of Savoy origin and 400,000 from the Central Massif, and in recent years the same proportion is true of the department of Seine-et-Oise. Again, during the period 1861–1926 the percentage of non-native inhabitants increased in the Rhône (Lyons) from 28 to 50, in the Bouches-du-Rhône (Marseilles) from 23 to 50, and in the Gironde (Bordeaux) from 15 to 32. A similar development took place in districts of expanding industry and hydro-electric power; in 1926, of the 87,000 inhabitants of the city and adjoining urban areas of Grenoble, 25,700 originated in Grenoble, 26,500 in the surrounding department, 37,500 in adjoining departments, 11,000 in distant ones, and 12,000 were foreigners. Fairly high percentages are found in l'Hérault (38) (in the wine-growing district of Languedoc), and in the depopulated agricultural districts, reaching 25–33 in Lot-et-Garonne and Tarn-et-Garonne. The highest percentages of non-natives in the whole of France are to be found along the coast of Provence; Var has 50 and Alpes-Maritimes 64 (33 French and 31 foreigners). Departments with the lowest percentages of strangers are in the west of France and over the Central Massif.

The population changes since 1919 are summarized in Fig. 14, which shows two distinct areas in France. In the north-west and centre there is a steady decline in population, a small proportion of foreigners, a high proportion of stay-at-home elements, and very few towns of any size. In the north, east, and south, on the other hand, there are greater fluctuations—there is often an increase, but sometimes a decline; here live the great majority of the foreigners; hither come all the migrants from the north-west and centre, as well as migrants from shorter distances within the zone itself. This zone contains most of the medium-sized towns and all the large cities save two.

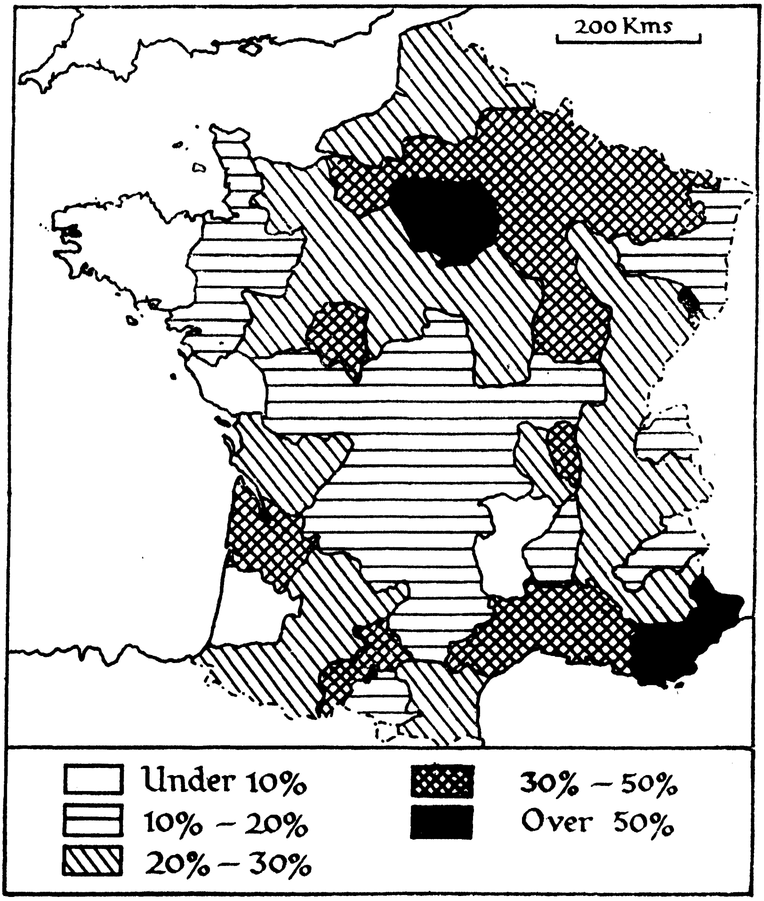


Fig. 13. The distribution of people living outside their native department, 1926 Based on the *Atlas de France*, Plate 78 (Paris, 1933).

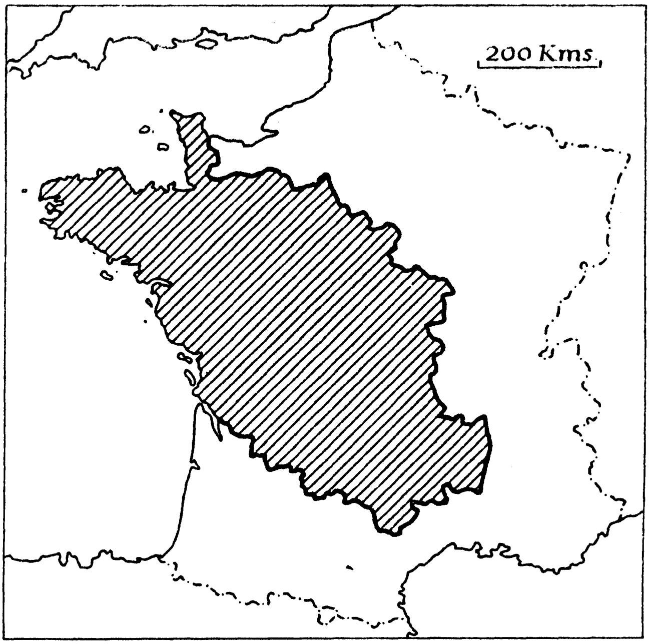


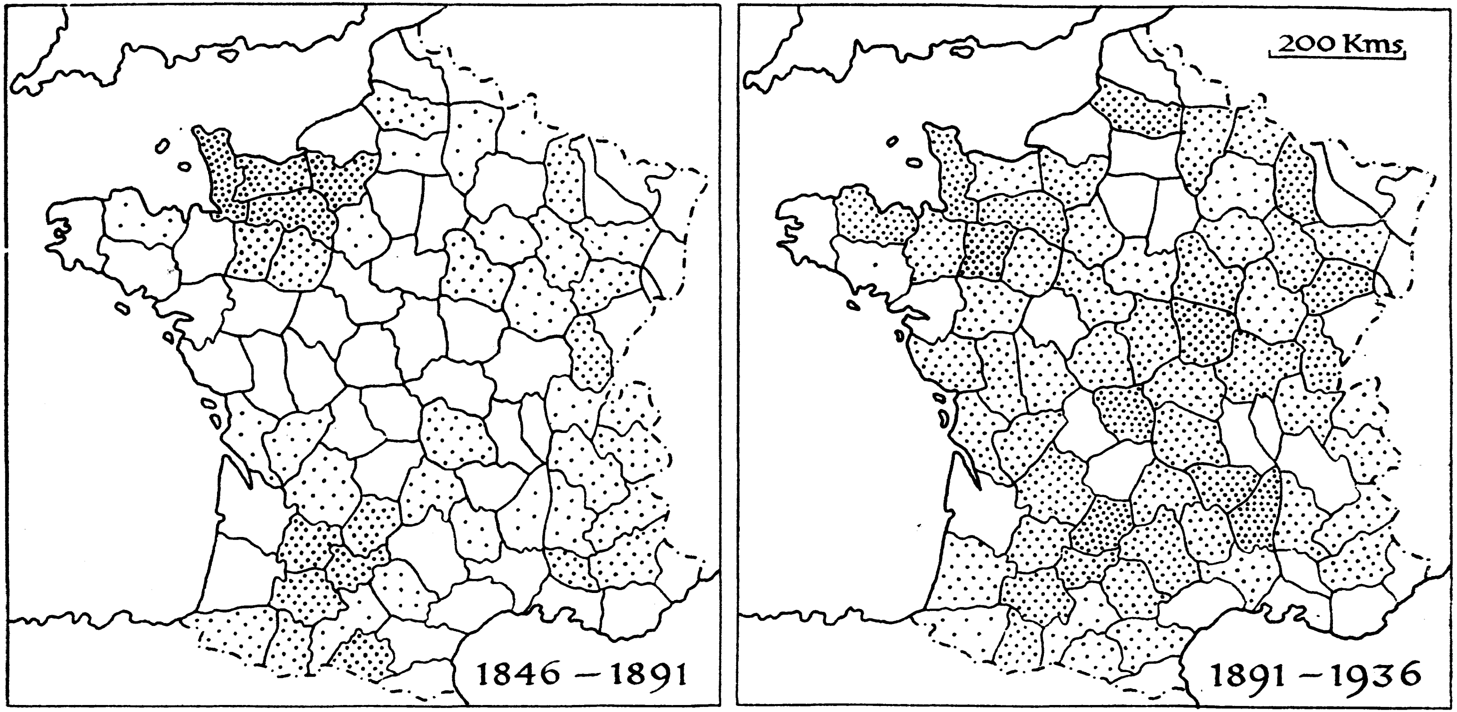
Fig. 14. A summary of population movements, 1919–34

Based on G. Mauco, 'Remarques sur le Mouvement de la Population en France depuis le début du XIXme siècle', *Annales de Géographie*, XLIV, 379 (Paris, 1935). The shaded area represents the departments of central and north-western France, in which, as a whole, population has declined; few strangers and foreign immigrants are found there, and emigration to other parts of France is considerable; there are few cities of any size. Compare with Figs. 11, 12, 13, 25, 104.

Rural Depopulation

The decline of population in the countryside is a matter of very serious concern to many thoughtful people in France. Two facts must be borne in mind, however. In the first place the phenomenon is part of a widespread movement in Europe and North America. In the second place the decline is found not only in inhospitable areas like the mountain regions of Europe, but also in many well-favoured regions. In England, for example, both Herefordshire and west Suffolk showed a slight decrease in 1911–31. France is not the only country which experiences a drift to the towns.

Figs. 15 and 16 indicate that much of the territory which has experienced decline consists of the mountain departments of the Alps, Pyrenees and Central Massif. Here a hard struggle has been given up in favour of life in more favoured parts of the same region, or in other countrysides, or in towns. In some valleys a declining density



Figs. 15 and 16. The decline of population, 1846–1936. Each dot represents a loss of 2,000 inhabitants in the period shown. Based on E. Levasseur, *La Population Française*, 1, 401–20 (Paris, 1889) and successive *Annuaires Statistiques* (Paris).

of population higher up has been partly offset by an increasing density lower down, though often enough, in the Alps, this is due to foreign immigrants. The general result has been that the thirty-one mountain departments of France have shown a declining population most of the time since 1850, some losing up to 30% between 1851 and 1931. In places the results are impressive to the outsider: the purely rural valley of the Ubaye in the Alps declined from 17,000 to 12,000, whole hamlets being abandoned; some of the higher villages now possess only a quarter of their earlier population. The influence of industry in the mountain regions has been unequal. Diversified small-scale industries have had the effect of retarding the decline in some districts. In the Jura, for example, the two non-industrial arrondissements of Lons-le-Saunier and Poligny declined by 24% from 1836 to 1901, while the more industrial arrondissement of Saint-Claude declined by only 4%. Hydro-electric development has helped to maintain such industries, but where it has led to large-scale specialized industry there has been frequently a need to import foreigners. In the Maurienne, Tarentaise and l'Oisans valleys of the Alps, industrial plants largely recruited their labour from Italians and others.

These mountain regions reached their peak of population in the middle of the nineteenth century. Savoy, for example, had a maximum of 564,000 in 1838, while its population in 1931 was about equal to that of 1800. A state of over-population existed; the peasants were forced to cultivate ungrateful soil that would not yield an adequate return; housing and hygienic conditions were bad; crops were uncertain; and the people suffered from under-nourishment, stunted growth, and deficiency diseases. Indeed, in many mountain departments it is possible to regard the increase in the first half of the century, rather than the decline in the second half, as the abnormal and undesirable feature. With improved communications, emigration grew.

The Central Massif has seen various degrees of decline in population. The figures relating to its departments sometimes conceal the situation in rural districts owing to the growth of small towns. In the south-west, the department of Lot has been declining especially after 1881, but this is not surprising in the poor and limited environment of the Causses. On the north-western edge, Creuse is in a similar position. The two most mountainous departments, Haute-Loire and Lozère, in the south-east, declined greatly between 1911 and 1931. On the northern border Allier demonstrated some striking examples, for here the environment is not so adverse; the result has been a decrease in the number of large communes and an increase in the number of small ones; twenty or more are in sight of disappearance; across the *campagnes* of the Bourbonnais more than 1,700 houses stand empty or ruined. In the Central Massif as a whole, however, the decline has largely involved the abandonment of land on the margin of economic cultivation.

A comparison of Figs. 15 and 16 with the preceding maps shows that the problem of rural depopulation is much more than that of mountain peasants leaving a difficult environment. The four main areas of most persistent decline have been Normandy, the Seine-Saône region, the centre and south-west, and the Alps, while in each of these lie departments which have experienced, at certain periods, the maximum rate of decline. Two of these, Normandy and the Seine-Saône region, have no mountain departments, while the central and south-western area includes most of the Aquitaine Basin and Charente. In the Orne the decrease is not surprising, for it is an area of poor soil; but in the Aube, Haute-Marne and Meuse, the background is not repellent, if not very attractive. In Aquitaine the departments of Lot-et-Garonne, Gers and Tarn-et-Garonne contain countrysides long regarded as among the most fruitful in Europe. The last factor to be remembered is that the two northern areas lie in that part of France where births normally exceed deaths, but that those of the Aquitaine basin are in the south where deaths normally exceed births. Migration is selective. It is usually the younger people who leave home, with effects upon the number of marriages and the birth-rate, while since the remaining population includes a greater proportion of old people, the mortality is higher. The average death-rate for France is 15 per thousand, but in the Lot department it is 20. Every year this department loses 52 people out of every 10,000 through the excess of deaths over births. It is not surprising therefore that the number of foreigners engaged in agriculture in Aquitaine is a high one. (See Appendix I, Foreign Population in France.)

In some districts of the south-western area lie 'fields untilled, plum trees in blossom and the buds ready to burst on the vine trellises of deserted houses'; another writer talks of a dying countryside. In one recent period there were 2,500 vacant farms in the department of Gers; in some districts the price of land is little more than a quarter of what it was in 1872. Perhaps in the short view of one or two generations the problem appears more serious than it really is, for the history of a countryside is a long-term matter. In the past, in Europe, there have been many examples of foreign colonists repopulating deserted localities. But it is undeniably a matter of serious concern, for there seems to be an increasing prospect that in parts of France 'more and more foreigners will come to live easily on a soil which generations before made rich and prosperous'.

No doubt many factors have been at work. As in other countries, the expansion of modern industry has discouraged the rural craftsman; improved methods in agriculture have sometimes reduced the need for labour; some peasants have left land which provided only a moderate return for the expanding market-garden industry. As elsewhere, it seems that the younger people have preferred the shorter hours and regular wages of the towns. It is possible, too, that the peasant feels that he receives less social regard than the townsman, although fortunately there appears to be a reaction against this attitude. The view most commonly advanced is that one factor in the problem is peculiar to France. It is that in areas where subdivision of holdings has gone very far the small peasant is disinclined to produce a further break up of the land and so limits his family. The factor is held to apply particularly in the south-west, and an investigation of conditions in the Chalosse district of the Landes department seems to bear out this view, for population has declined most in the east of the district, towards Gers, where there are more peasant properties; in the western area, where there is more *métayage*, the peasant is much less frequently a proprietor and has not therefore feared division of the land.

Progress has been made in some rationalization of rural population: in 1920, several departments in the Aquitaine Basin began co-operating with the coastal departments of Brittany to settle cultivators on vacant holdings in the south-west. Belgians, Swiss, and Poles were also brought in. The warm climate, however, appears to have adverse effects and the immigrants suffer easily from fatigue. The Comité régional du Sud-Ouest subsequently turned to Spaniards and French Canadians.

RURAL SETTLEMENT

Main Types of Settlement

The study of rural settlements has made considerable progress in France in recent years, and it is now possible to make fairly satisfactory generalizations about the distribution of villages, hamlets and isolated farms. To take one example: western Normandy and Champagne show two widely different arrangements of habitation. In the former, in the department of Manche, there are 18,930 inhabited places, while in a district of the latter a population but 14 % smaller is found in only 1,580 inhabited places. Clearly, in western Normandy the population is very dispersed, either in small settlements or in single farms, while in Champagne it is grouped into villages.

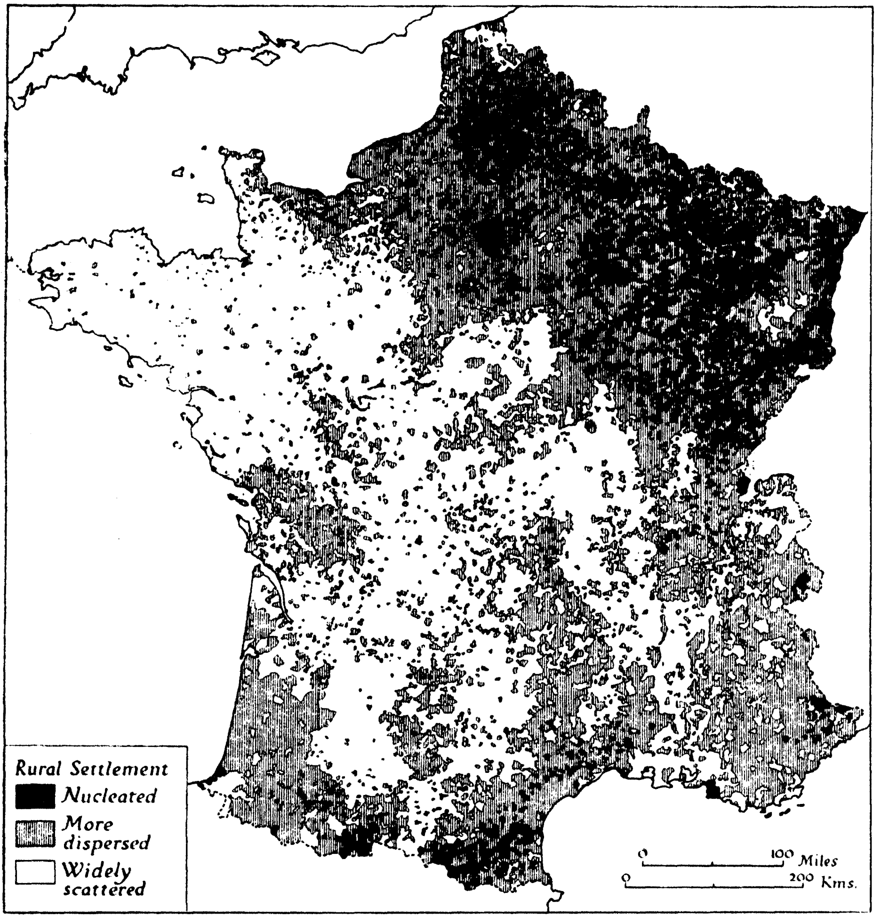


Fig. 17. Types of rural settlement in France

Based on the *Atlas de France*, Plate 80 (Paris, 1938).

Where settlement is 'nucleated' most dwellings are grouped in villages.

Fig. 17 presents a generalized picture of the types of rural settlement in the whole of France. The most striking feature is that the north and east is predominantly a land of villages. They are not, of course, confined to this area; they become more frequent again, as the Mediterranean is approached, and in Languedoc many villages are prominent on heights that could be easily defended against the pirates of earlier days. Other restricted areas of villages are the regions around Caen in Normandy, of the Planèze in Auvergne, and about the middle Adour in the south-west. The Alps and Pyrenees are not without true villages, but here conditions are naturally more variable. On the other hand, there are localities in the north-east where the true village is rare. Many hamlets can be found in the Pays de Caux, in Brie, and on the western slopes of the Vosges, while in eastern Flanders many single farms have been established in recent centuries away from the original settlements. These exceptions, however, do not invalidate a generalization about the north-eastern distribution of the true village in France.

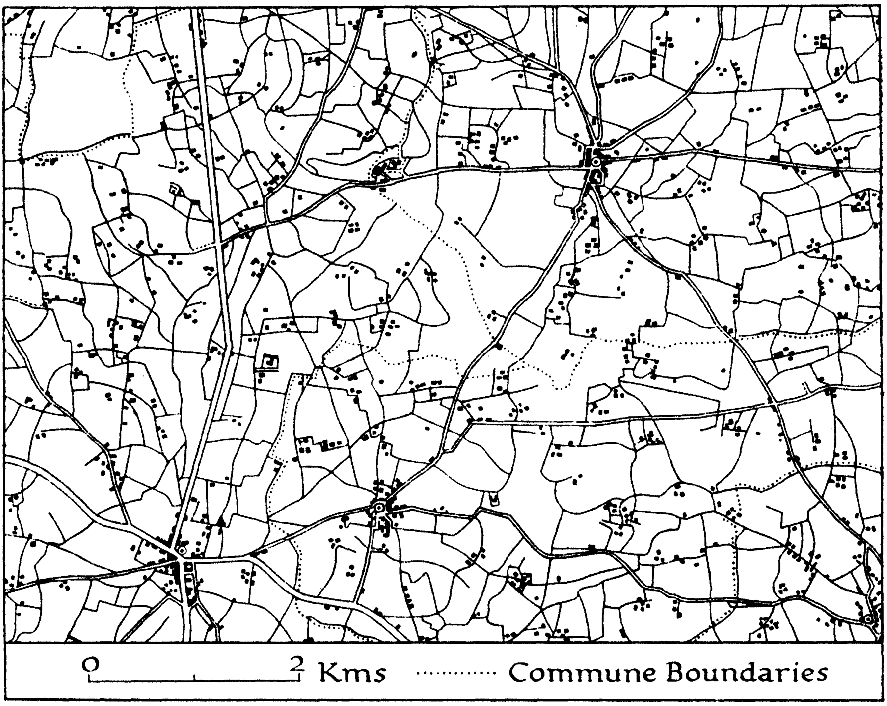


Fig. 18. Scattered farms and hamlets in Brittany (near Rennes, department of Ille-et-Vilaine)

Based on G.S.G.S. Series 4040 B 1 : 50,000, sheet 75 NE, Rennes, reproduced from the French 1 : 80,000 (1901).

Relatively dispersed or scattered settlement, on the other hand, covers about two-thirds of France—in the west, centre, and south, except near to the Mediterranean. In 1787–9 the English traveller, Arthur Young, noticed, for example, in the Basin of Aquitaine, how farms and houses were scattered everywhere. The most pronounced dispersal is in Brittany, in western Normandy and over most of the Central Massif; in many localities of these regions more than two-thirds of the population lives in dispersed settlements. The French geographer De Martonne describes the countryside of Brittany as follows:

'No more villages of houses clustering together like those of the Paris Basin. Near the church steeple you will see only two or three houses, the school and the mairie, one or two inns, a forge if you are on a main road. Each peasant makes his living in the middle of a little domain which he works in his own way. Around the farm he has his pasture and his fields, all enclosed by hedges of trees growing in banks of earth.'

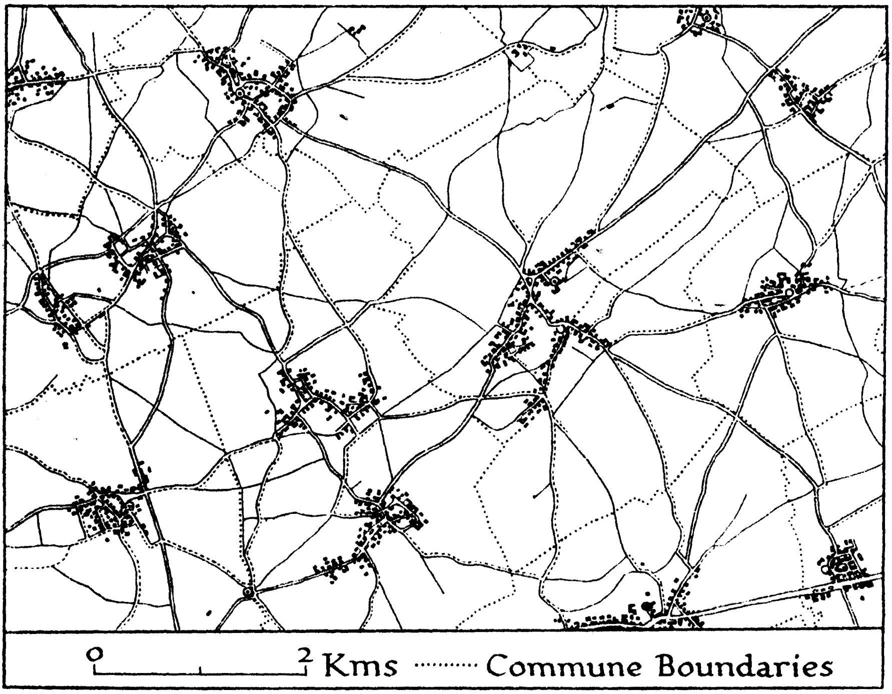


Fig. 19. Villages in north-eastern France (south-west of Amiens, department of Somme)

Based on G.S.G.S. Series 4040 B 1 : 50,000, sheet 20 NE Neuchâtel, reproduced from the French 1 : 80,000 (1901).

Dispersal of settlement is not quite so absolute in Brittany as this account would suggest, for while it is true that the village of eastern France is absent, there are embryo villages or superior hamlets which occur all the way towards Normandy. Often, these subsidiary settlements possess their own small chapels dedicated to local saints.

Geographical and Historical Factors in Settlement

The readiest explanation of these contrasts in settlements is that they reflect differences in water supply. Thus, impervious rocks and many springs seem to favour dispersal of dwellings, while a limestone area, where water is restricted, seems to demand a grouping of habitations around a spring or well. This factor must have influenced the choice of sites in the early settlement of France, but it was not the chief factor and there are many anomalies. In parts of the middle Garonne valley, for example, people have preferred to live on the low plateau tops and to fetch their water from a distance. In Languedoc there are villages located near a few hectares of good land in preference to being near a spring, and many good springs are without a village. In the Pays de Caux, where the subsoil is chalk and water is limited, the population is dispersed in the west and nucleated in the east. The nucleated villages of eastern France are found alike on the well-watered Ardennais plateau, on water-bearing clays and on permeable limestones. Throughout wide areas over both the clays of humid Champagne and the chalk of dry Champagne, over 85 % of the population is in grouped settlements. Villages are also widespread around Langres, where a considerable variety of soils occurs in a small area. The neighbourhood of Langres itself consists of a plateau of Oolitic limestone considerably dissected by the westward-flowing headwaters of the Marne, so that a heavy marl is exposed in the valleys; eastwards lie alternate tracts of limestone and clay or marl which differ considerably in soil, and in water supply. Over all this area settlement seems to have taken no account of differences of soil and water supply, for villages are found on lower Lias sandstone, on the Jurassic plateau, on Oxford Clay, on the marls, and both where springs are frequent and where they are few.

These facts show that no simple and satisfactory explanation will cover all the differences in types of settlement to be found in France, and that they must be due as much to complex historical factors as to physical causes. The village was associated with a society dependent upon open field agriculture, and dating as far back, at any rate, as the fifth and sixth centuries, when France was settled by Franks, Burgundians and Visigoths (see vol. II, p. 7) after the breakdown of Roman Gaul. The area of the true village in north-eastern France differs very little from the area of mediaeval 'open field' agriculture.

The base of this agriculture was two or three large open fields, divided into long strips and cultivated in common, together with smaller areas of pasture and natural meadow, and sometimes woodland. After harvest, the stubble of the open fields provided grazing for the flocks and herds; this was known as *vaine pâture*, and it survived until the nineteenth century. Towards the south, in the villages of the lower Rhône and Provence, the open fields are less regular, for the practices of rotation of crops and open pasture were less compelling. Here, Mediterranean products and methods of cultivation modified the open-field village of the north. Aquitaine in the south was anomalous. Its productive soils long supported a widespread agriculture, yet the village is absent, save for a number of later medieval settlements (*bastides*) founded by individuals or churches. Open field agriculture was little practised.

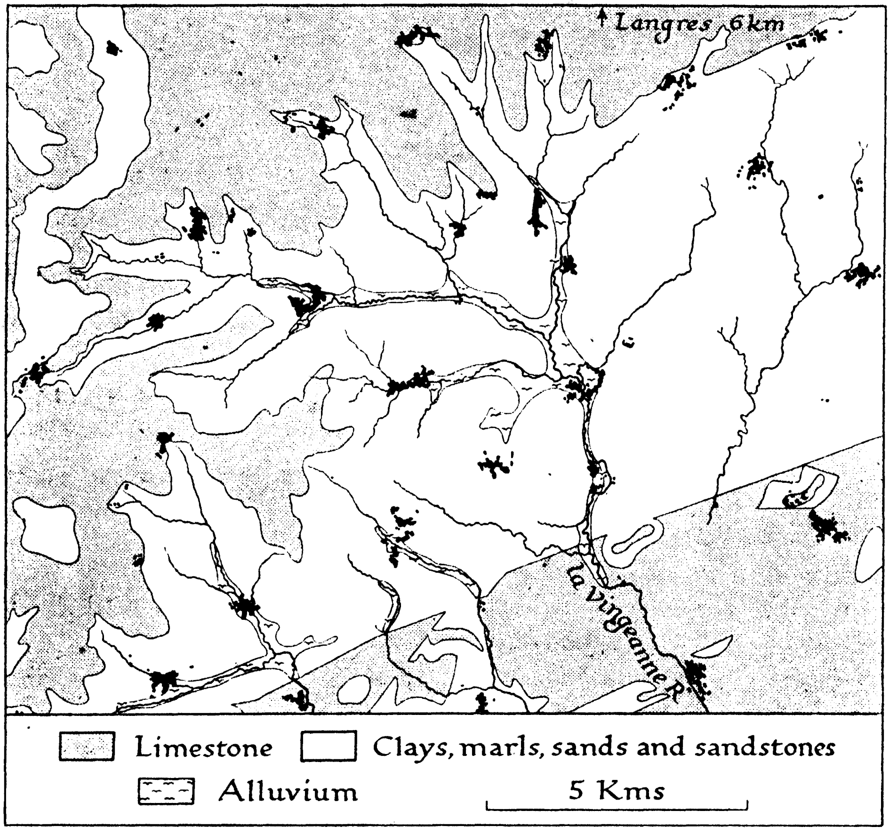


Fig. 20. Villages in the region to the south of Langres

Based on 1 : 80,000 *Carte Géologique*, sheets 98, 99 (Revision of Paris, 1890). Settlement here is nucleated, with houses and farms grouped in villages, and very few outlying buildings. These villages occur more on the clays, marls and sand than on the Oolitic limestone.

The geographical background of west and central France seems to have exercised a more obvious limiting effect upon the kind of economy possible to its inhabitants, and thereby to have restricted the possible forms of settlement to one of dispersal. The crystalline and metamorphic rocks of Brittany and the Central Massif provided abundant water and so permitted dispersal of settlement, but of more importance was the fact that these regions of older rocks, with wetter soils and more humid climate, offered less scope for agriculture to their inhabitants.

On these infertile lands more pasture was available. In some localities land was taken from the waste, cropped for a few years and then allowed to revert to its former condition; often only one or two harvests were secured at the price of fallows up to 20 or 30 years. This temporary cultivation remained a feature of Breton agriculture for a long period, being referred to as late as the eighteenth century. Finally, there have always been considerable areas of uncultivable land in these mountainous areas, and they remain to-day as *landes* or *montagnes*.

Historical Development

The map of settlement is, however, not merely a reflexion of the conditions which held when the Franks, Burgundians and Visigoths made their entry into France; it records also the modifications of later centuries. The most important of these was the clearing of woodland and the creation of new settlements, a process which began soon after the early settlement and continued intermittently until very recent times, for in the eighteenth century reclaiming activity secured exemption from some taxes. The greatest clearing seems to have taken place in the Middle Ages between 1000 and 1250. This progress was not evenly spread in space: in Poitou, unlike northern France, there is little record of colonization of wood and waste during this period. Clearings were apparently much older, and in the eleventh century villages were as numerous as they are to-day; indeed, many bore the names of Roman proprietors. Nor was the progress of colonization even in time, being broken at times by plagues, by warfare, or by the movement of population. During the fifteenth century the ravaging of cultivated land during the Hundred Years' War allowed an increase in woodland, in parts of western France, and in Saintonge the people for a long time said 'The forests came back into France through the English'. Similarly, after the Thirty Years' War, considerable extents of wooded country reappeared in the Jura.

The settlement that resulted from the colonization of woodland took various forms. It was based sometimes upon a nucleated village, as in the countryside around Langres; such settlements were usually old ones, following soon after the coming of the Franks and Burgundians. This is true of much of eastern France, where the forest was less dense and natural clearings more frequent. Where clearings in woodland took the form of a progressive expansion from an existing settlement, however, the 'linear' village developed, for each successive settler built a house at the end of the road. Behind this house stretched his land in a single long strip running back towards the remaining woodland. This arrangement of spaced houses, with fields equal and

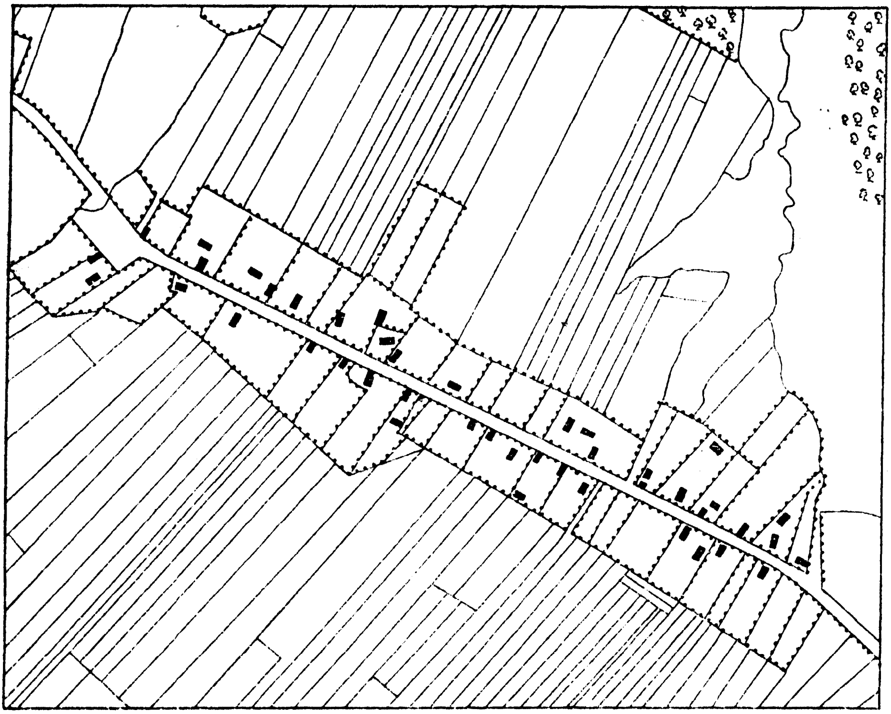


Fig. 21. A 'herring-bone' village in north-eastern France: the hamlet of Petit-Bois-St-Denis in 1715. (The hamlet to-day is in the commune of La Flamengric north of Vervins, Department of Aisne.)

Based on M. Bloch, *Les Caractères Originaux de l'Histoire Rurale Française*, Plate I, (Oslo, 1931).

In a district which was originally forested individual clearings were often made piecemeal, each colonizer establishing his house at the end of a 'street', and acquiring a strip of cultivable ground running back towards the remaining woodland, at right angles to the road.

parallel and a single strip for each occupier instead of the intermixed strips of the open-field village, is sometimes called the 'herring-bone' type—in Germany the *Waldhufen*. In France much of this kind of settlement began in the thirteenth century: it is found particularly in the Ardennais region around Biésme, in the valleys of the Aisne and Oise, and above all in the Pays de Caux of Normandy, where the village of Neuville Champ d'Oissel is 4 km. long, and St Nicolas d'Aliermont is even 9 km. long. The third and most widespread type of settlement resulting from the colonization of woodland is fragmentary in character. It is found in most parts of France, but more particularly in Maine and Brittany. Place names often record this advance—the appellation *Les Essarts*, for example, means 'the clearing'. The Forêt d'Othe has many names ending in *-grange*, *-essart*, *-borde*, *-loge*, *-villeneuve* and *-neuville*; in the Perche region

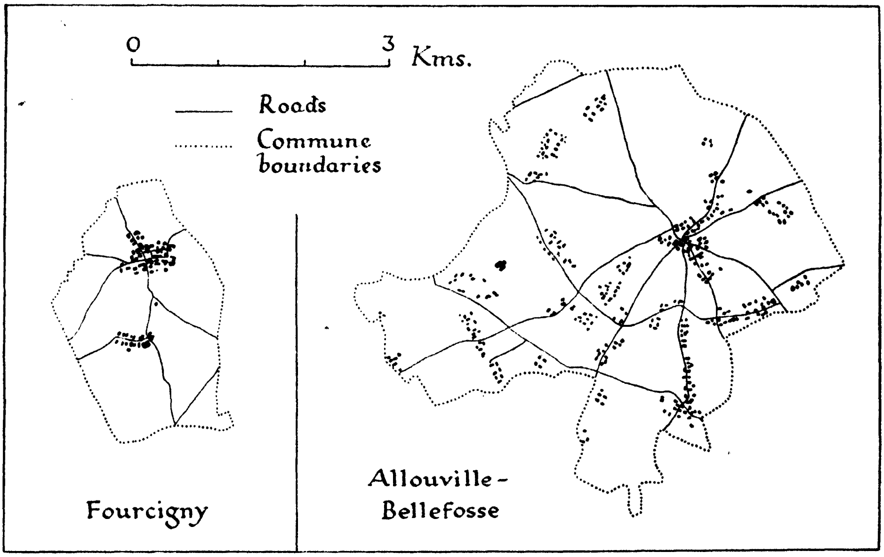


Fig. 22. Modifications of original village settlements

(i) Fourcigny, in the extreme south of Picardy (west of Poix, Department of Somme). [Based on G.S.G.S. Series 4040 B 1 : 50,000, sheet 20 NE, Neuchâtel, reproduced from the French 1 : 80,000 of 1910.] Near the centre of this commune is a hamlet, later in origin than the parent settlement but nearly as large. The hamlet originated as a clearing in woodland.

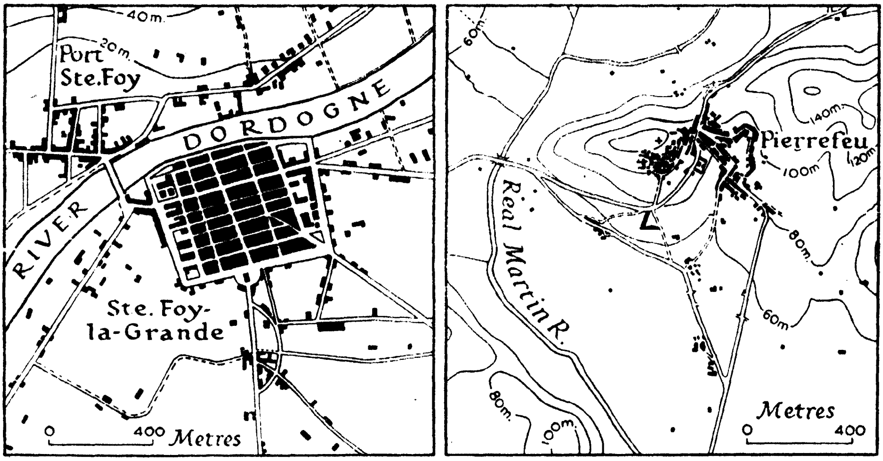
(ii) Allouville-Bellefosse, in the Pays de Caux, Normandy (west of Yvetot, Department of Seine-Inférieure). [Based on G.S.G.S. Series 4040 B 1 : 50,000, sheet 19 SE, Yvetot, reproduced from the French 1 : 80,000 of 1910.] Beyond the original village near the centre of the commune lie many later settlements, some of which represent early clearances in woodland, others, which only consist of a few farms, being later offshoots of these hamlets.

many names end in *-ière* or *-erie*, prefixed by the name of the first colonizer; names ending in *-l'huys* in the Morvan, are similar, e.g. *l'huys Brechard* or *l'huys au Page.*

Much of this clearing, perhaps the largest amount, was carried on by individuals, but more is known about the organized colonization by ecclesiastical and lay lords. In eastern Normandy, for example, monasteries founded in the seventh and eighth centuries were usually along the Seine, often in territory long settled, but in the eleventh and twelfth centuries the new foundations were all inland in the heart of extensive forested regions. An interesting development took place in Maine, where the land is too broken and infertile to allow widespread agriculture, and where the large village and manorial system of the north-east had never existed. Here, the earliest settlement was an extensive scattering of single homesteads, but in the second half of the eleventh century small planned villages called *bourgs* were established by the Church, especially St Vincent of Le Mans. This example was followed by lay lords who built other *bourgs* in the west, *villes-neuves* around Paris, and *bastides* in Aquitaine. Analogous to clearing of woodland was reclamation of marsh. The draining of the polders along the north-east coast was started as early as the eleventh century. In the twelfth century in the Val d'Anjou and around Saumur the seigneurs extended their domains by beginning the construction of the Loire *levées*, and in the sixteenth century, under Sully, the swampy district of Bas-Médoc was reclaimed. Settlement varied in types, sometimes taking the form of isolated farms and sometimes of string-like villages along dykes and roads, as in the former marsh of St Omer in Flanders.

Later ages saw comparatively little change in the appearance of the countryside and none comparable with the enclosures of eighteenth-century England. In the north-east, farming improvements led to the creation of big farmsteads in Picardy and the Île de France. Arthur Young, in 1787–9 and 1794, was surprised to find that nine-tenths of the enclosed land of the west was worked in the same way as the open fields of the north-east, with similar rotations and with extensive fallowing. Just before the time of Arthur Young, however, there had begun a movement towards the destruction of the communal character of village agriculture. Three great investigations in 1766–87 examined the problem of *vaine pâture* (the obligation upon each cultivator in an open field village to allow grazing over his stubble), and between 1767 and 1777 edicts allowed liberty of enclosure in much of the north-east, while elsewhere local edicts affected single villages; but little came of these proposals. The French Revolution resulted in much land changing hands; the cultivator now had liberty to grow what he pleased, and the practise of common grazing on the stubble was attacked. As a result the custom of *vaine pâture* gradually died out during the nineteenth century.

In short, the French countryside has not undergone very much change, except where it has been affected by industry. Whereas in England open fields were almost universally enclosed by the beginning of the nineteenth century, the *plaine* or *campagne* of north-eastern France has remained open, with relatively little alteration. The Midi, as always, has more land enclosed, often by stone walls. The lands of early enclosure, as in England, remain: hedges are frequent among the scattered farms of the Aquitaine Basin, while to the west the Armorican Massif is still the *bocage* countryside with tree-lined hedges, although in places changes in economy and agriculture are allowing the hedges to decay.



(i) (ii)

Fig. 23. Two types of villages in the south of France

Based on the *Atlas de France*, Plate 82 (Paris, 1939).

(i) Ste Foy-la-Grande is an example of a 'bastide' village founded in the Middle Ages, and laid out on a rectangular plan. It lies on the Dordogne river, 30 km. east-south-east of Libourne, Department of Gironde.

(ii) Pierrefeu is an example of a Provençal village, with the older part lying on a hill as a defensive site near the Ste Croix Chapelle (shown by a cross). In recent centuries the village has extended downhill. It lies 25 km. north-east of Toulon, Department of Var.

TOWNS AND CITIES

Number and Distribution of Towns

Administrative divisions, which are the basis of census returns, frequently give a misleading picture of urban development, in that suburbs which are functionally part of a city are counted separately. It may be assumed that most towns and cities are in fact rather larger than they appear to be, in France as elsewhere.

According to the 1936 census there were in France 341 administrative towns with a population exceeding 10,000, apart from the suburbs of Paris in the Seine department:

Over 100,000 inhabitants	17
80,000–100,000 inhabitants	13
50,000–80,000 inhabitants	13
30,000–50,000 inhabitants	37
15,000–30,000 inhabitants	120
10,000–15,000 inhabitants	141
Over 10,000 inhabitants	341

A great many of the smaller of these towns are satellites of the great cities, and it is only through the maintenance of their administrative independence that they appear as towns in the census. The towns of the northern coalfield form a series of units which lie near each other and which are closely related in function.

Principal Groups of Satellite Towns

Population	Paris	Lyons	Bordeaux	Lille	St Etienne	Northern coalfield
80–100,000	—	1	—	—	—	—
50– 80,000	2	—	—	—	—	—
30– 50,000	1	—	—	1	—	3
15– 30,000	12	3	5	6	1	5
10– 15,000	27	2	2	3	4	15
	42	6	7	10	5	23

Other examples of suburbs which have maintained their administrative independence are Schiltigheim (Strasbourg), Sanvic and Harfleur (Havre), La Seyne (Toulon), Sotteville-les-Rouen, Petit-Quevilly and St Etienne-du-Rouvray (Rouen) and Montigny-les-Metz (Metz).

The larger cities of over 100,000 inhabitants were the following:

Paris (Seine department)	4,962,967
Marseilles	914,232
Lyons	570,622
Bordeaux	258,348
Nice	241,916
Toulouse	213,220
Lille	200,575
Nantes	195,185
Strasbourg	193,119
St Etienne	190,236
Havre	164,083
Toulon	150,310
Rouen	122,832
Nancy	121,301
Reims	116,687
Roubaix	107,105
Clermont-Ferrand	101,128

There is clearly a small number of such cities in France compared with the fifty-five in Great Britain. Furthermore, there are only four in France with a population of over a quarter of a million, and only one city comparable in size with the British cities of Bristol, Leeds, Sheffield or Edinburgh. Of the seventeen cities in France with 100,000 inhabitants or more, seven are maritime ports and one primarily a river port, while six are primarily manufacturing and industrial centres, of which only three are at all similar to the English type of coalfield city. The differences result, generally speaking, from the different economic development of the two countries.

The smaller towns and cities of 50,000–100,000 inhabitants show equally the comparative absence of the specialized manufacturing centre in France. Of the twenty-six of this size, two are satellites of Paris—Versailles and Argenteuil, three are ports and one a naval base, four are primarily manufacturing centres like Mulhouse, Grenoble, Tourcoing and Villeurbanne, while of the remaining sixteen the majority are of a kind characteristic of France—the provincial city which is the business centre for a considerable area, and often the seat of a university or a bishopric. They are cities which have not grown so fast as the ports or manufacturing centres, yet have kept pace with progress. Such are Limoges, Amiens, Nîmes, Montpellier, Rennes, Angers, Tours, Le Mans, Orléans, Avignon, Besançon. Some were capitals of provinces under the Ancien Régime, and are well fitted to-day to act as regional capitals.

The 157 towns of 15,000–50,000 inhabitants are more varied in their nature. Some are functionally part of larger cities: five, for example, are satellites of Paris—Meudon, Rueil-Malmaison, Livry-Gargan, Aulnay-sous-Bois, St Germain-en-Laye. There is still a number of 'historic' provincial towns, smaller than the regional capitals—Bourges, Poitiers, Angoulême, Périgueux, Narbonne, Nevers, Chartres, Albi, Blois. Several towns of this order of size are Riviera resorts like Cannes or Antibes; a number are ports, such as La Rochelle; and many are substantial market centres like Haguenau in Alsace, Agen in Aquitaine, Bourg in the middle Saône valley. But a number belong to a type so common in England, though there they are often larger—the specialized town of the industrial age. Such are Le Creusot; Lens, Denain, Lievin, Hénin-Liétard in the mining zone of the north; St Nazaire, the shipbuilding port; Cherbourg, the Atlantic pier-head; Dunkirk, the port for the northern coalfield; Colmar, a textile centre.

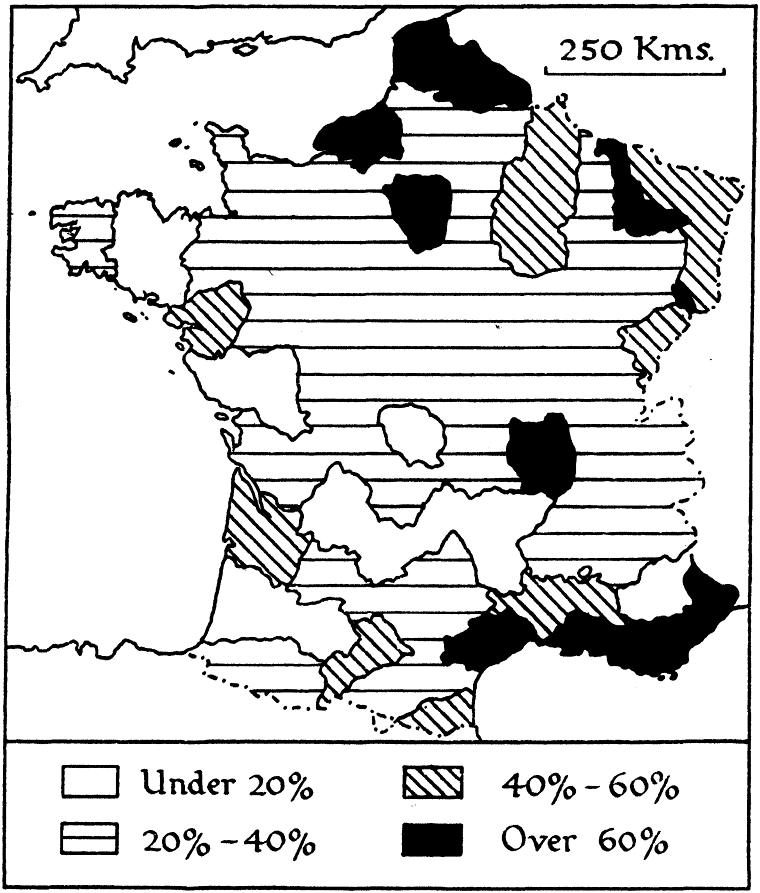


Fig. 24. The distribution of urban population, 1931, as a percentage of the total population, by departments

Based on the *Atlas de France*, Plate 78 (Paris, 1933).

A prominent feature of French urban geography in the present century has been the Riviera resorts, some of which, especially Nice, the largest, are growing very rapidly. Paradoxically enough they draw attention to a very curious feature of that geography, the complete absence of the seaside resort as it exists in England. This is not to say that the small watering place is not to be found on the French coast, but it is remarkable that there is no analogue to the large seaside towns of England, which are quite different from Nice and often attain a considerable size. In 1931, there were four English seaside resorts with a population exceeding 100,000 and five with a population of 50,000–100,000. The difference between the two countries is doubtless due in part to the greater urban populations to be found in England, though social characteristics are not without their influence. In fairness it should be pointed out that the curious feature about these parasite towns may not be their absence in France, but, as Professor Demangeon suggests, their existence in England.

The distribution over the whole of France of its larger towns proceeds fairly logically from the nature of the geographical and economic background. They are nearly all located on the coasts or near the frontiers of France. Of these peripheral cities, furthermore, the majority lie near the eastern or continental frontiers—only Nantes and Bordeaux are situated on the Atlantic coast. Clermont-Ferrand, the only centrally located French city, was the latest to attain a population of 100,000. The distribution of all the towns and cities over 10,000 is, of course, more widespread, in that many of the smaller ones derive much of their function from serving the surrounding agricultural population. Several concentrations stand out —the Paris region, the northern coalfield, the Meurthe-Moselle valley, the plain of Alsace, the Riviera coast, and Languedoc. The southern region of the Alps, the Landes, the Pyrenees and the highest part of the Central Massif stand out as gaps. Over the greater part of the Massif, however, in spite of the considerable extent of thinly populated territory, urban centres are as well developed as in Brittany.

There are very few towns and cities south-east and south-west of Paris, a situation which is mainly a repetition of the general map of population distribution, and in this large area the sparsity of towns is striking. Beyond the satellites of Paris itself, within a radius of 100 km. (60 miles) of Paris, there is only one town with a population exceeding 20,000 (Chartres). Thirty years ago Brunhes drew attention to the fact that within this circle there was no city of 50,000, but the absence of small towns is even more remarkable. The situation is very different in the neighbourhood of London: not merely are there the coast towns, and the swarm of small towns in Kent, Surrey, Middlesex and Essex, but also, to the west and north-west, a number of centres which have expanded very rapidly in the period 1911–31—Bedford, Luton, Aylesbury, Uxbridge, Watford, Slough and Reading, of which

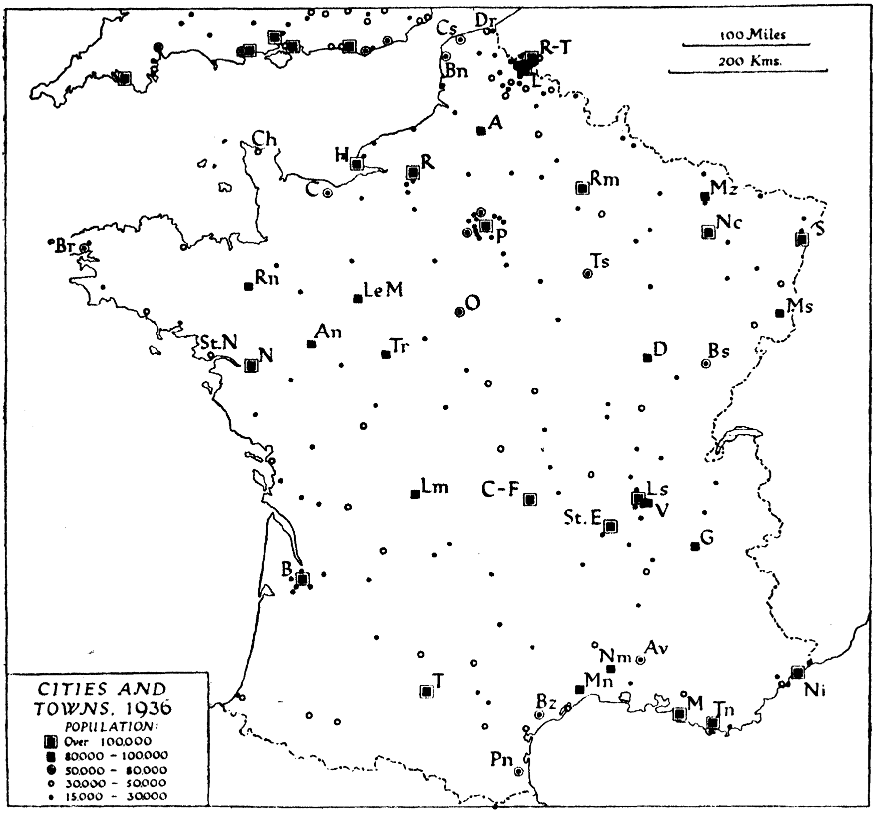


Fig. 25. Cities and towns with over 15,000 inhabitants, 1936

Based on *Annuaire Statistique, 1938*, Table 2, pp. 5–8 (Paris, 1939).

The number of towns and cities shown is 200; this number does not include the fifty-three administrative towns which are suburbs of Paris within the Seine department, although the 'satellites', such as Versailles and Argenteuil, appear. The two separate administrative towns of Roubaix and Tourcoing are shown as one town. The towns in southern England are shown for purposes of comparison, according to the 1931 census of England and Wales. A, Amiens; An, Angers; Av, Avignon; B, Bordeaux; Bn, Boulogne; Br, Brest; Bs, Besançon; Bz, Béziers; C, Caen; Ch, Cherbourg; Cs, Calais; C-F, Clermont-Ferrand; D, Dijon; Dr, Dunkirk; G, Grenoble; H, Havre; L, Lille; LeM, Le Mans; Lm, Limoges; Ls, Lyons; M, Marseilles; Mn, Montpellier; Ms, Mulhouse; Mz, Metz; N, Nantes; Nc, Nancy; Ni, Nice; Nm, Nîmes; O, Orléans; P, Paris; Pn, Perpignan; R, Rouen; Rm, Reims; Rn, Rennes; R-T, Roubaix-Tourcoing; S, Strasbourg; StE, St Etienne; StN, St Nazaire; T, Toulouse; Tn, Toulon; Tr, Tours; Ts, Troyes; V, Villeurbanne.

the last named had almost reached 100,000 in 1931. Figures of total populations in the neighbourhood of the two capitals demonstrate this difference clearly enough: within 30 km. of the centre of Paris

(18 miles) there were 6,000,000 and beyond this up to 100 km. the population increases only very slightly above that figure. In the London region, on the other hand, within a radius of 100 km. there is a population of between 11 and 12 millions. It is clear that the metropolitan regions of the two countries are fundamentally different.

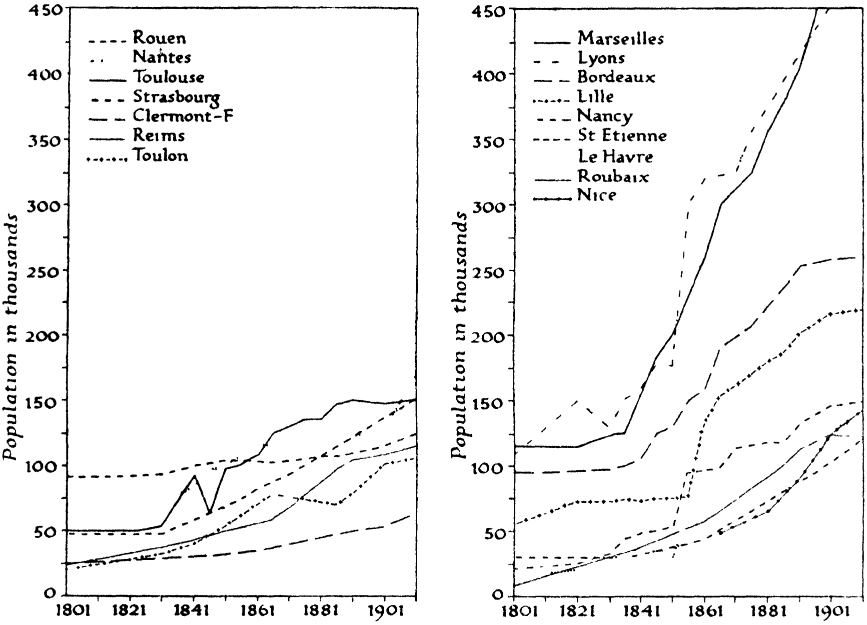


Fig. 26. The growth of French cities in the nineteenth century

It can be seen that all the French cities grew slowly in the early part of the century, but from 1840 to 1850, when the influence of railway building made itself felt, the majority began to grow much more rapidly.

Urban Growth.

The growth of French cities has generally proceeded differently from that of English cities. In the 40 years after 1800 no French town showed any great increase comparable with the increases which were taking place in the English coalfields at that time. From 1800 to 1840 only Lyons, Marseilles, St Etienne and Lille grew to any extent. It was through the development of railways that the expansion of most French towns was accelerated, for there was a general increase in the rate after 1840. The increase was not uniform however: Rouen continued to grow very slowly for the rest of the century; Nantes, Toulouse, Toulon, and Reims experienced a moderate increase; the rapidly growing towns now included Bordeaux, Havre and Nancy as well as Lyons, Marseilles, St Etienne and Lille. It was not until

1895 that the population of Marseilles exceeded that of Lyons. Soon after its acquisition by France, Nice began a rapid expansion which has since continued. Clermont-Ferrand is the only large city which can be called a product of the twentieth century.

Recent statistics are sometimes reduced in value by the tendency to-day for population to shift to the outer rim, but they give some idea of expansion if not decline. The most rapidly growing of the smaller cities are the following:

Population in 000's

	1926	1931	1936		1926	1931	1936
Rennes	83	88	98	Le Mans	72	77	84
Dijon	83	91	96	Metz	69	79	83
Grenoble	85	90	95	Brest	67	70	79

Limoges, Amiens, Nîmes and Montpellier, all of which have over 90,000 inhabitants, are growing more slowly; Mulhouse declined from 99,000 to 96,000, though the whole agglomeration of city and suburbs continues to expand.

Population of the sixteen largest cities after Paris (*in* 000's)

	1926	1931	1936		1926	1931	1936
Marseilles	652	801	914	Strasbourg	174	181	193
Lyons	571	579	570	Havre	158	165	164
Bordeaux	256	263	258	Rouen	123	123	123
Lille	202	201	200	Roubaix	117	117	107
St Etienne	194	191	190	Toulon	115	133	150
Nantes	184	187	195	Nancy	114	120	121
Nice	184	219	242	Clermont-Ferrand	111	103	101
Toulouse	181	194	213	Reims	101	112	117

Among the largest cities the most obvious feature is the continued growth of Marseilles at such a rapid rate, for 262,000 or 40% in 10 years is more characteristic of American cities; it is more rapid than the rate during its expansion towards the end of the nineteenth century, and in France has been exceeded only a few times during the expansion based upon railways and industry 60 or 70 years ago. The next most rapidly growing town is Nice, with an increase of 31% in the 10 years 1926–36, and next are Toulon 30%, Toulouse 17%, and Strasbourg 10%; Nantes (6%) showed a modest increase.

It would not be correct to assume that the remaining cities have declined or remained stationary as they appear to have done, owing to the movement of population to the surrounding communes in many instances. Thus Rouen appears to have remained with a population of 120,000 ever since 1900, but in reality the left-bank suburbs and tributary towns have expanded considerably, until in 1936 the entire agglomeration totalled 260,000. The percentage of the population living on the left bank grew in 36 years from 25 to 43, and the number is now 111,000. Similarly, Dunkirk had only 31,000 inhabitants in both 1931 and 1936, whereas in the latter year it can be claimed that the population of Greater Dunkirk was 95,000. It is clear that an account of 'conurbations' or city and town groups, rather than of census divisions, would give a true picture of city growth in France, although it should be mentioned that the examples of Rouen and Dunkirk are rather exceptional, and that the discrepancies between the statistics for administrative cities and conurbations are not all so considerable. (A 'conurbation' is a group of towns and cities of which the built-up areas are contiguous.)

Conurbations

A French investigator, J. Soulas, has compiled a statement of conurbations and their populations for the census year 1936, and his findings are appended below. According to this list there were in that year twenty-nine conurbations in France of more than 100,000 inhabitants, with a total population of 12,500,000, or almost one-third of the population of the country. It will be noticed that only one is a 'million' conurbation. Working on a similar method, Professor Fawcett calculated that Great Britain possessed thirty-seven in 1931, of which, however, seven exceeded a million, while the total conurbation population was 26,800,000, or nearly 60% of the national total. While in Great Britain a number of the administrative cities 'disappear' in the list of conurbations (there were 54 cities of 100,000 or more and only 37 larger units), in France only one of the 100,000 cities 'disappears' owing to the combination of Lille and Roubaix, and thirteen larger groups are created from the administrative cities of under 100,000 by the inclusion of their adjoining communes. English students will probably find that the French list implies far too generous a standard in the delimitation of several of the conurbations, and that on a precisely similar basis several of the mining valleys of south Wales could be classed with the larger units. Aix, for example, lies 20 km. from the nearest part of Marseilles. Nevertheless, the list is of value in drawing attention to the chief centres of urban population in France.

Population in 1936 *of the twenty-nine French Conurbations of more than* 100,000 *Inhabitants, after Soulas*

Conurbation	Population in 000's	No. of communes included	Principal communes
1. Paris	5,500	—	—
2. Marseilles	990	9	Marseilles 914; Aix 43; Aubagne 14
3. Lyons	802	32	Lyons 571; Villeurbanne 81
4. Lille–Roubaix-Tourcoing	731	38	Lille 201; Roubaix 107; Tourcoing 78
5. Bordeaux and suburbs	400	13	Bordeaux 258
6. 'Industrial Street' of St Etienne (Unieux to Rive de Gier)	348	29	St Etienne 190; Firminy 20; Chambon-Feugerolles (le), St Chamond, Rive de Gier, 15 each
7. Nice littoral group, Cagnes to Beaulieu	272	12	Nice 242
8. Coal-mining group, Lens–Bruay–Hénin-Liétard	270	23	Lens 33; Bruay-en-Artois 30; Liévin 25; Hénin-Liétard 22
9. Strasbourg and suburbs	268	21	Strasbourg 193
10. Rouen and suburbs	261	23	Rouen 123
11. Nantes and suburbs	239	9	Nantes 195
12. Toulouse with neighbouring communes	226	13	Toulouse 213
13. Havre, including Harfleur	207	7	Havre 164
14. Nancy and suburbs from Pompey-Frouard to Dombasle	200	17	Nancy 121
15. Toulon (with La Seyne and adjoining communes)	192	6	Toulon 150; La Seyne 22
16. Lorraine Iron group (Briey–Thionville)	155	33	Thionville 19; Orne, Fentsch and Moselle valleys
17. Valenciennes industrial group (Anzin, Raismes, Condé-sur-l'Escaut, Trith-St-Léger)	147	22	Valenciennes 43; Anzin 15
18. Mulhouse and suburbs	140	12	Mulhouse 97
19. Grenoble and suburbs	133	14	Grenoble 96
20. Metz and suburbs	125	17	Metz 83
21. Reims and suburbs	123	6	Reims 117
22. Clermont-Ferrand and suburbs	121	7	Clermont-Ferrand 101
23. Brest and suburbs	119	4	Brest 79
24. Tours and suburbs (banks of Loire and Cher)	117	8	Tours 84
25. Douai industrial group	115	20	Douai 42
26. Amiens and suburbs	107	10	Amiens 94
27. Angers, including Les Ponts-de-Cé, Trélazé and adjoining communes	106	8	Angers 88
28. Dijon and suburbs	105	7	Dijon 96
29. Côte d'Azur from Cannes to Antibes	102	7	Cannes 49; Antibes 25; Vallauris 10

NOTE ON FAMILY ALLOWANCES

Since the middle of the nineteenth century the slowing up in the rate of natural increase of the population has attracted considerable attention, and in a variety of ways attempts were made to encourage larger families. An extensive literature appeared over a number of years. Private and semi-private organizations, such as the *Alliance Nationale pour l'Accroissement de la Population*, were formed to carry on propaganda, while twenty-one private endowments, such as the *Fondation Cognac-Jay*, have been established to grant subsidies and prizes to large families, several hundred thousand francs being distributed annually. The government introduced, from the end of the century, measures providing tax exemptions, invalid relief, poor relief, exemptions from military burdens, reduced rates for rail travel and other concessions for parents. These measures were carried further after the war of 1914–18. The government also set out to define its attitude to birth control and abortion. A law of 1920 makes propaganda in favour of birth control and abortion an offence. A law of 1923 changed the legislation concerning abortion, making the act of abortion a misdemeanour liable to moderate penalties, a measure thought likely to be more effective than the previous legislation which regarded it as a serious crime. Neither of these two laws is considered to have much effect, and some authorities consider that in France the annual number of abortions exceeds the annual number of births.

The most important of the measures for the encouragement of larger families is the family allowance system, which has now become widespread. It is based upon the assumption that if parents are given financial assistance towards the cost of rearing children they will be encouraged to have larger families. The earliest allowances in France, however, were begun many years ago by employers for quite different reasons, mainly as a measure of securing a stable labour supply. It is only in the last two decades that family allowances have come to be regarded as a positive means of influencing the population position.

As early as 1854 a factory owner had established a fund to give assistance to his employees who had families to support, and later some government employees were also given financial assistance. During the war of 1914–18 the system spread, beginning with engineering firms in the Grenoble region, and by 1920 there were 230 employers operating family allowance funds for 50,000 employees, distributing annually 4 million francs, while all lower paid categories of public servants were also receiving allowances. The state example of paying family allowances encouraged the extension of the system to industry, and the shortage of labour in the years 1918–30 provided further incentive to employers to pay these allowances, in order to secure greater stability of labour by the employment of the largest possible number of married men with children. Another motive for the employers was a belief that allowances helped to withdraw family men from interest in the class struggle. To employees the scheme appeared as a means of raising their standard of living. In 1932, some 245 funds covering 1,850,000 employees, and distributing annually 380 million francs, were in operation, and affiliated to a central organization. As the number of private funds grew in these years, the rate of allowances paid to state, departmental and municipal employees increased. Eventually, in 1932, legislation was effected by which all employers were ultimately to subscribe to 'equalization' funds and to grant allowances for dependent children to all French and foreign wage earners and salaried employees.

In 1933 the number of beneficiaries amounted to 5 millions. The programme was extended to more industries, and in 1936 the system was made applicable to all industries and commercial undertakings employing more than ten people, including multiple branch concerns, while in the same year the law was extended to agriculture. The wide extension of the scheme is shown by the fact that the total payments in 1937 were 1,340 million francs, compared with 872 millions in 1936, and were estimated to reach 1,500 million francs for 1938.

Considerable variations were naturally to be found between different areas, both in the rates paid and the subscriptions levied on employers, owing to local differences in wage levels, cost of living, etc. The table on p. 79 illustrates certain rates.

When the scales were revised in 1938, it was provided that the minimum rates should be fixed by the Minister for Labour on the recommendations of the Higher Family Allowances Commission. The age to which allowances were payable for children, apprenticed or pursuing a course of studies, was raised to 17, but after November 1940, no allowance was to be payable for an only child over 5 years old. The new arrangement came into force in April 1939.

Machinery for Payment. Funds for the payment of family allowances are obtained entirely by subscriptions from employers. The charges amount to over 2% of the total wages bill in industry. Beginning in 1918, Equalisation Funds (*Caisses de Compensation*) came to be established as a means of regularizing the financial side. Employers contribute to the appropriate funds according to the number of people they employ, and each fund then distributes the allowances. The Act of 1932 did not create any special machinery for the administration of family allowances, and the existing funds set up by employers were left untouched. Employers not already affiliated to equalization funds were obliged to subscribe. It is important to notice that in order to prevent employers from reducing their liabilities by employing unmarried staff, subscriptions to the funds (*caisses*) are payable for all workers, whether married or single. In 1938 a national compensation fund was established to make grants to local compensation funds, on which the charges were found to be abnormally high. The national fund, which is to be managed by the *Caisse des Dépots et Consignations*, is to obtain its resources from subscriptions paid by all the local compensation funds. Until 1932 the subscriptions paid by employers were all voluntary.

Rates of Family Allowances, francs per month

	One child	Two children	Three children	Four children	Each additional child
1936: normal rate	30	70	120	200	80
1936: rate for state employees	52	76	157	196	—
1937: rate in Paris	30	80	200	400	200
1938: rate in Paris	60	160	300	500	200
1938: rates in agriculture	15 to 25	30 to 85	67·5 to 200	110 to 320	27·5 to 120
Rates as percentages:					
1938: rate in Paris as percentage (approx.) of mean wage of 20 skilled trades	4	10	18	30	12
1939: minimum rate at revised scales for the whole of France, as percentage of adult male wage earner	5	15	30	45	15

Conclusion. It is probably too early to form a judgement upon the effectiveness of family allowances in retarding the decline of the birth-rate. The widespread application of the system has been in effect for too short a time to permit of statistically sound conclusions being drawn. As to the funds which were privately operated by firms on a considerable scale soon after 1920, such as the Michelin Company's fund for its employees at Clermont-Ferrand, it is held by some authorities that the higher birth-rate occurring among the beneficiaries of the funds represents inconclusive evidence. The employees are not a typical cross-section of the adult population as a whole, and some of the employees may have migrated to the Michelin works so as to take advantage of the allowances.

While the payments under the schemes add to the income of parents, the addition is considerably less in amount than the increase in the cost of living incurred through children. It has been estimated that three children add to the income of a lower grade civil servant an amount equal to only half of what they add to his cost of living. Hence it is considered by some that the scale of family allowances is too small to have any real effect upon the population position. At the most they may have resulted in a slight diminution of the rate of decline in the birth-rate. Such a view is only an opinion, and so far real knowledge cannot be arrived at until statistical investigation of the family allowance system has reached a much more advanced stage.

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(1) *The Census*

Vauban made an estimate of the number of inhabitants of France as long ago as 1700, and other estimates were made in 1762 and 1764. The first organized census was carried out in 1800, and in the next year, 1801, began the series of censuses, at intervals of five years, which has since been continued, except for the census of 1871, which was postponed for one year, and the census of 1916, which was not held.

When the census forms have been collected, they are first utilized to determine the figures of *population légale* in each commune, i.e. the numbers of persons having their habitual residence in the commune. The forms are then tabulated by the *Statistique Générale de la France*, and the entries analysed by category. The figures of *population présente* are obtained at this stage, i.e. the population actually present in each commune on the day of the census. In 1939 the later calculations had not been completed; only the figures of *population légale* or resident population have been published. These figures have been used in the foregoing account. The completion of the census was not expected until 1940. (See also p. 375.)

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Chapter II

PARIS

The Site: The Growth of the City: Inner Paris: Greater Paris: Bibliographical Note

THE SITE

The successive stages in the expansion of Paris from its nucleus on an island in the Seine are closely related to the physical features of its site, and are still clearly embodied in its plan. After receiving the waters of the Marne, the Seine, cutting through a line of low heights, begins the first of its loops towards the north. On the southern bank it receives a small tributary, the Bièvre, which after flowing east and north is deflected eastwards again by a low spur, the Mont Ste-Geneviève (Fig. 27). In general the relief on the south bank is broken and of moderate elevation. This broken relief imposed limitations upon the city's early development to the south, but farther to the west near the Champ de Mars a portion of the flood plain allowed expansion. Off the Mont Ste-Geneviève, in the centre of the river, lay a number of small islands, now reduced to two—Île de la Cité and Île St Louis (Plate 10). These islands, and the numerous side branches which originally characterized this stretch of the river, due perhaps to the decrease in the slope of the bed, formed a complicated pattern, but it happened that a line from the southern height across the present Île de la Cité avoided most of the obstacles.

On the north bank, the relief is in contrast to that of the south. A semicircle of heights leaves the river at Charonne on the east, and runs through Ménilmontant, Belleville, Montmartre, and Chaillot, returning to the river at Passy. These heights mark the northern slopes of the Quaternary course of the Seine, the loop of which was much more pronounced than that of the present river (Fig. 27). Probably owing to changes in the course of the Marne, which increased the velocity of the Seine, the latter cut off the extremity of this loop to occupy its present course. Thus the area immediately north of the Seine is a segment of a meander plain, originally sloping not to the Seine, which cut a narrow bed through it, but towards the older course. In the early history of the city this was occupied in its western portion by a stream flowing from Ménilmontant, and in its eastern end by an area of marshland, Le Marais.

The north bank therefore afforded ample space for expansion, and the growth of Paris in this direction has been closely related to this abandoned river course. At one period, portions of it were incorporated as a moat forming part of the city's fortifications. At times, too, it has proved a source of anxiety to the city engineers, for the Seine in flood has occasionally attempted to reoccupy its former bed. Thus in the floods of 1910 subsoil penetration by this channel flooded large areas round the Gare St Lazare. The original relief, however, has been largely hidden by drainage, by newly-made ground, and by buildings. It is important to note also that the northern ring of heights is not continuous: Montmartre is isolated by gaps to east and west, the former being especially important as it affords an easy line of communication northwards.

The significant features of the site therefore are the approach of the southern hills to the river, the islands in the river bed reducing the difficulty of bridging, the open plain on the north bank, and the breaches in the northern heights. The three main areas—southern heights, islands, and northern plain—have persisted from early days as subdivisions with distinct characteristics associated respectively with Université, Cité, and Ville.

The Growth of the City

The Early Medieval City

Before the Roman occupation of Gaul, the Île de la Cité was the site of a settlement, Lutetia, the centre of a Gaulish tribe, the Parisii. By this time the Seine had been bridged and the island was close to an intersection of routes, a south-to-north land route and an east-to-west river way. Roman observers remarked upon the busy boat traffic on the river. Under Roman administration the principal section of the town was laid out on the southern bank, on the slopes of the Mont Ste-Geneviève. A Roman road from Chartres ran northwards across the Île de la Cité and up through the Montmartre-Belleville gap; on the north bank it was joined by another road descending the valley westwards from Melun, and it was around this junction that commerce was increasingly to centre.

During the first centuries of the Middle Ages however progress was slow. In the disturbed times following the Roman withdrawal and the Frankish advance, when the Roman town on the south bank was destroyed, settlement was chiefly confined to the island with two bridgeheads north and south of the river. Under the Merovingians, in the fifth and sixth centuries, order was re-established, and with the expanding influence of the Church the elements of civilized life gradually returned. During the reign of Clovis, the basilica of SS. Peter and Paul was built on the southern quarter, and other churches soon followed (St Benoît, St Séverin). Settlement on the outskirts was encouraged by ecclesiastical foundations, the abbey of St Germain l'Auxerrois on the north bank, and of St Germain des Prés on a former left bank island below the city limits. The surrounding forests were gradually cleared during the ninth century, and with the revival of trade the value of the position of Paris became recognized, by none more clearly than the early rulers of the House of Capet. Indeed, it was their great achievement to establish Paris as the undisputed capital of France. By their efforts the advance of the Norsemen was stayed at the city walls after a siege during which the southern quarter was again destroyed, and their royal duchy, extending north and south of the Seine and conveniently linked by Paris, was welded together to become the foundation of the kingdom of France.*

It was to the centralizing policy of the French monarchy more than to any combination of geographical factors that the city's predominance and extraordinary growth were due. As the seat of the central government, the courts of law, and the great university of the Middle Ages, Paris drew to itself, with increasing attractive power, first the professions and trades necessary to sustain their needs, and later an industrial population to meet the demand for goods as close to the market as possible. Thus the development of Paris has been from an administrative centre to a great commercial market, and finally to an industrial concentration. The development of a planned system of roads, of canals, and of railways merely tightened the hold of Paris on the country.

The effect of this Capetian centralizing policy was soon visible in the development of the city, which during the twelfth century assumed its characteristic tripartite form. The Île de la Cité was the centre of royal and ecclesiastical administration. In the middle of the century the building of the new cathedral of Notre Dame was begun, and the church schools formerly grouped around it moved across to the south bank where, around the theological college founded by Robert de Sorbon in 1253, the University and its quarter crystallized. Here gathered, besides masters and scholars, the attendant scribes, followed later by the printers.

On the north bank was the 'Ville', the predominantly commercial

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* For the historical background, see vol. II, pp. 46 et seq., of this Handbook.

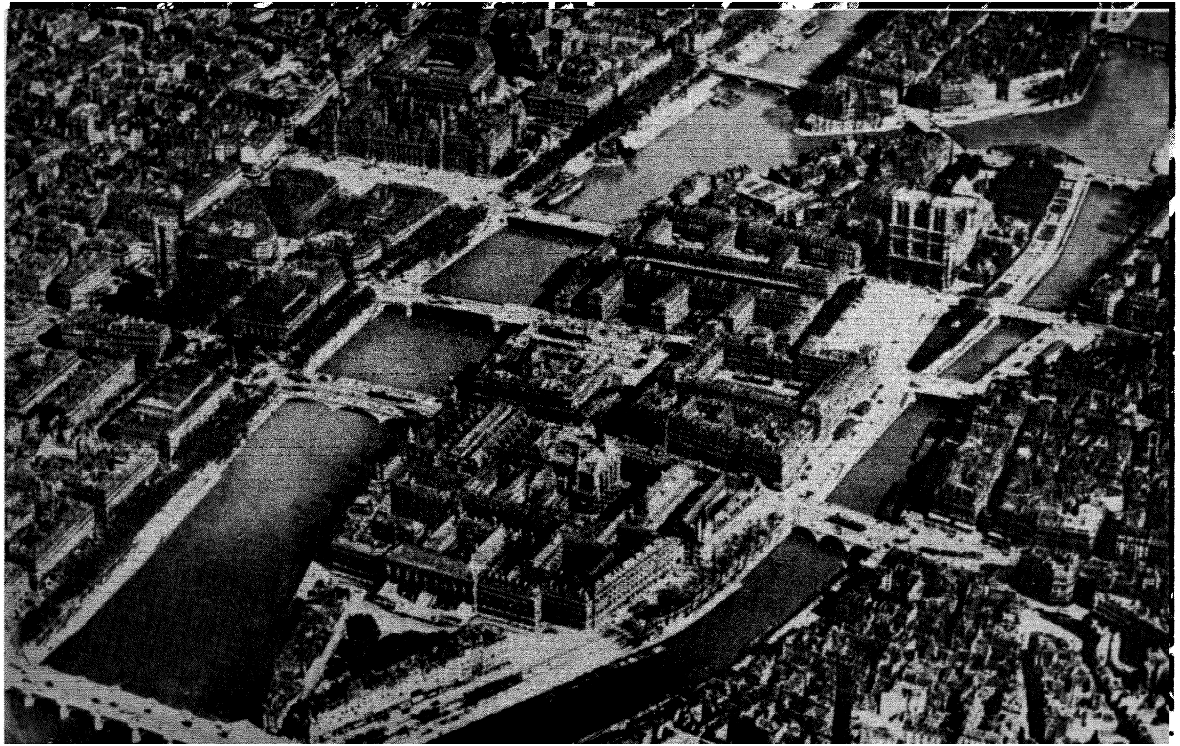

Plate 10. Paris: The Ile de la Cité

On the island is the Palais de Justice in the foreground, with Notre-Dame Cathedral and the Hôtel Dieu near the other end. There is a clear contrast between the congested streets and buildings of the 'Quartier Latin' on the left bank (on right of picture), and the more elegant tree-lined avenues and open spaces of the right bank, where the Hôtel de Ville is prominent.

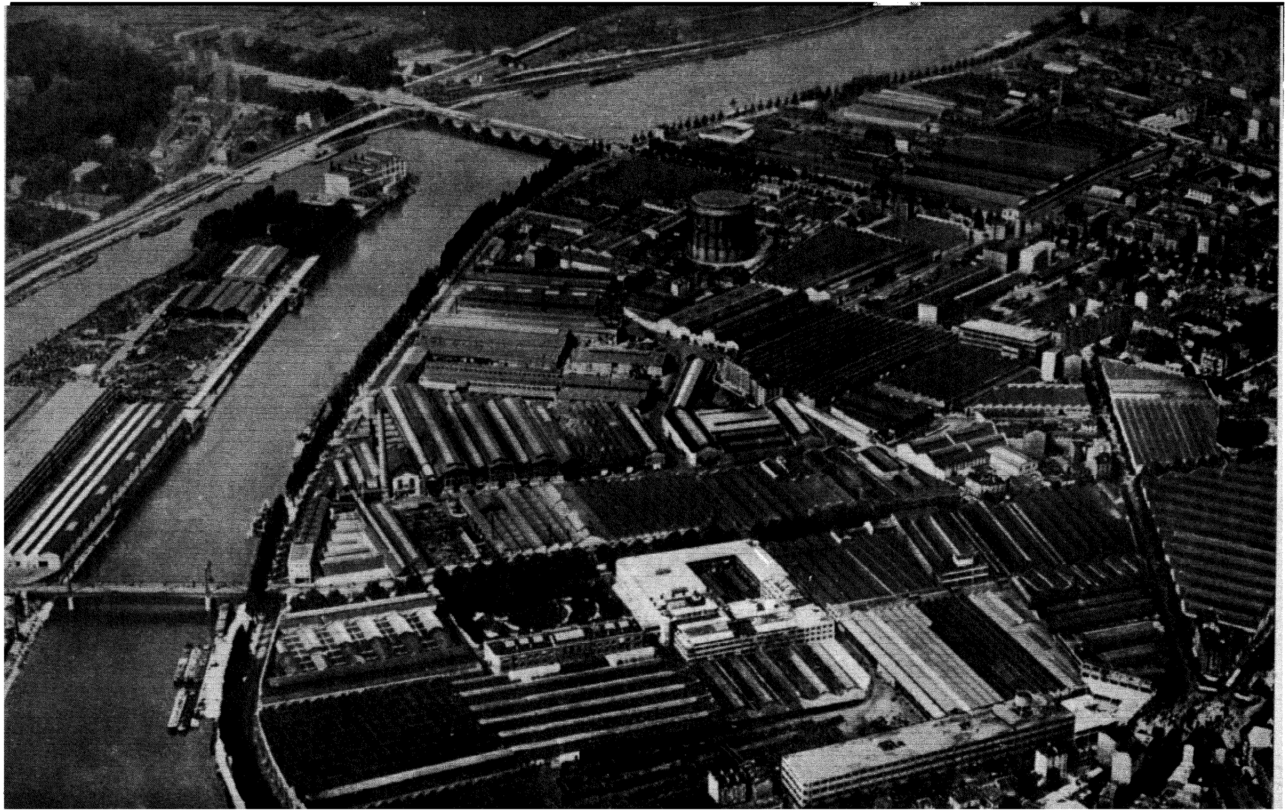

Plate 11. Factories at Billancourt, Paris

The great Rénault works extend over a large area and have even spread to the island in the Seine.

quarter; upstream from the bridges, along the creeks and quays, grew the first 'ports' of Paris. The importance of the river traffic, which carried down to the city the wines and timber of the upper Seine basin, is seen from the growing influence of the 'Corporation of water merchants', the head of which became during the thirteenth century the chief civil officer of the municipality. The principal 'port' was on the site now occupied by the Place du Châtelet, near the Hôtel-de-Ville, and close to the *croisée de Paris*, the junction of the main routes. Between the water front and the roads were established large markets, an area still partly occupied by the Halles Centrales.

The City Walls

It was around this threefold area that Philip Augustus between 1180 and 1210 built the first city wall (Fig. 27). From the eastern limit of the trading quarter on the north bank it ran in a rough semicircle, the maximum distance from the river being about 800 m., to rest in the west on the recently built fortress of the Louvre. On the south bank it enclosed the Mont Ste-Geneviève, forming the limit of the city in this direction until well into the seventeenth century. The next period of growth was therefore on the north bank, at first eastwards until the marshland along the old course of the river was reached. This marsh was gradually drained and occupied by market gardens to supply the growing city, until it was built over in the eighteenth century. The second important line of fortifications, built by Charles V about 1370, began at the Bastille and incorporated the Louvre on the west. Within the old limits the population had been growing rapidly: on a basis of a census of hearths taken in 1329 it is estimated that the population was then about a quarter of a million, a remarkable figure for the period. The new walls, however, included considerable areas of open land sufficient for some time to absorb growth which at first slackened owing to disturbed political conditions, although by the seventeenth century the city was spreading rapidly beyond the walls, mainly northwards, despite successive royal edicts establishing forbidden zones. These were partly prompted by fears of inability to feed so large a concentration, hence the preservation of the gardens of Le Marais and the attention to the water supply. The city was dependent largely upon water from the Seine, pumped directly from the river at La Samaritaine and the Pont Notre Dame. In the middle of the fourteenth century the population was nearing half a million, a stage in its development which was not materially passed until the industrial era.

The next extension of boundaries had a fiscal rather than a military reason; to facilitate the collection of the *octroi* a wall, the 'Mur des Fermiers-Généraux', was built between 1784 and 1791, with a radius some 1,500 m. larger than that of the preceding wall. This carried the northern limits of the city to the line of the old river course and the foot of the northern heights. It enclosed the faubourgs which had grown up along the radiating routes and much open land, especially on the south bank. Portions of the old ramparts became the line of the great or inner boulevards.

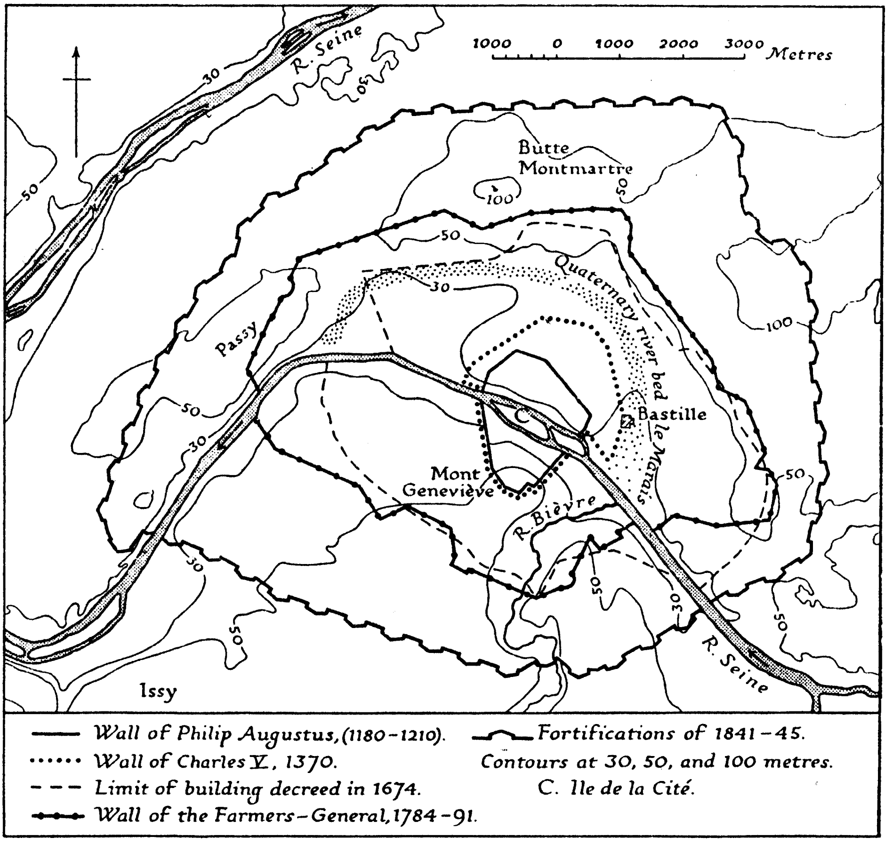
1000 0 1000 2000 3000 Metres
R. Seine
30
50
Butte Montmartre
100
Quaternary river bed
le Marais
Passy
C
Bastille
Mont Geneviève
R. Bièvre
R. Seine
Issy
Wall of Philip Augustus, (1180-1210).
Wall of Charles V, 1370.
Limit of building decreed in 1674.
Wall of the Farmers-General, 1784-91.
Fortifications of 1841-45.
Contours at 30, 50, and 100 metres.
C. Ile de la Cité.

Fig. 27. The site and growth of Paris

Based on G. R. Crone, 'The site and growth of Paris', *Geographical Journal*, vol. XCVIII, p. 37 (London, 1941). For the work of Philip Augustus, see vol. II, p. 49 of this Handbook.

Throughout the eighteenth century the population did not rise above half a million, but with the progress of the industrial revolution the city again pressed upon its limits. By 1841 the inhabitants numbered 935,000, and it was then decided for military reasons to fortify a much extended area. The *enceinte* was thrown along the northern heights beyond Belleville and Montmartre and southwards towards Gentilly and Issy. This brought within the limits of Paris a number of considerable towns, for Belleville had at that time a population of 57,000 people, and Montmartre 35,000. With the incorporation in 1861 of the communes thus enclosed, the population of Paris rose to 1,690,000. The wall of the Farmers-General then became the line of the outer boulevards.

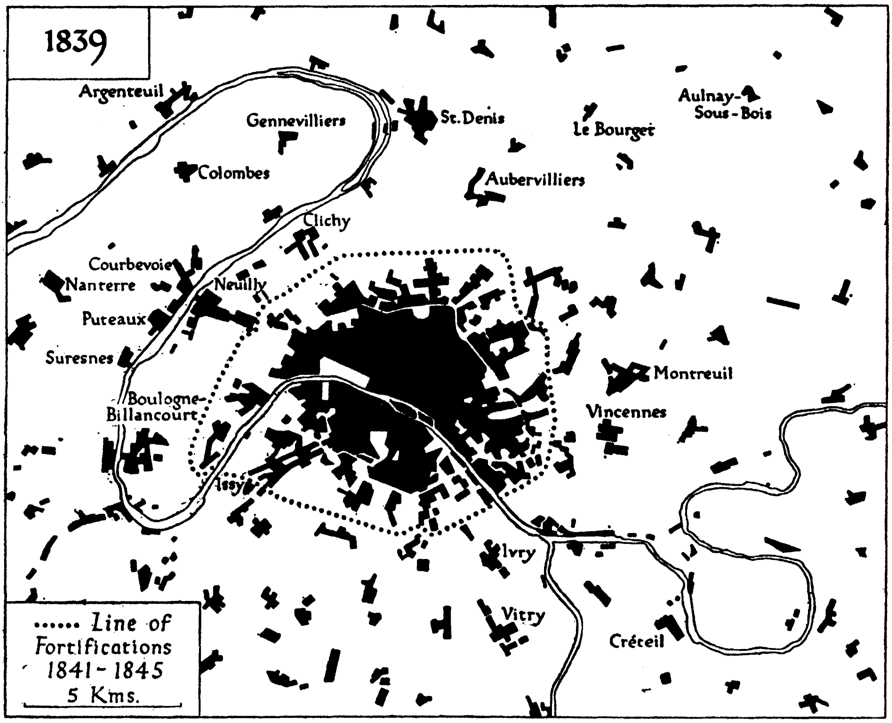

Fig. 28. The built-up area in 1839

Based on *Carte des Environs de Paris*, drawn in 1839 at the Dépôt Générale de la Guerre, under the direction of Lieutenant-Général B. Pelet.

Industrial Growth

With industrialization and improved communications, the activities of the population also began to change markedly. Formerly, the occupation of the Parisian workers, apart from the predominating official and commercial classes, had lain mainly in trades requiring traditional skill and taste rather than an abundant supply of raw material. With the building of canals and railways, supplies of materials for heavier industries, particularly coal and iron, became available and industry was freed from its dependence upon the river front. In the twenties there was an epoch of canal building. The Canal St Denis and the Canal St Martin were followed a few years later by the Canal de l'Ourcq. With the building of the canals the prosperity of Paris became even more closely linked to waterborne traffic, which was handled at various quays and basins along the river and the canal system, while river ports have developed up and down stream from Paris to serve the industrial suburbs, e.g. at Ivry, St Ouen, St Denis, and Gennevilliers.*

Close on the canals followed the railways. On the north bank the gaps east and west of Montmartre served as convenient routes ending at the great termini of the Gares de l'Est, du Nord, and St Lazare, placed near the outer boulevards. The area enclosed in 1841 made much land available for building, and around the canal basins and stations gathered warehouses and slaughterhouses, railway goods yards and repair shops, factories and gasworks, with tenements in the neighbouring quarters to house the workers.†

While Paris was thus expanding and its industries growing, wide changes were also being made to the plan of the city. These were initiated by Napoleon III, partly on aesthetic and partly on military grounds, and the work of reconstruction was entrusted to Baron Haussmann between 1854 and 1869. Narrow streets and congested areas gave place to wide boulevards and squares (Place de l'Etoile, Boulevard St Michel); parks and gardens were laid out (Bois de Boulogne); public buildings such as the Opéra were erected; and the ring of outer boulevards was built on the line of the wall of the Farmers-General. This work was naturally costly, and Haussmann met with much opposition: it is to his persistence and the emperor's support that modern Paris owes its spaciousness and its vistas.

As a result of its industrial development, the population of Paris grew rapidly after 1861, increasing by 25 % in the next twenty years. From 1881 to 1901 the rate of increase declined to about 20 %, and with the beginning of this century the period of rapid expansion was approaching its close. The population reached a maximum in 1921 with a figure of 2,906,000, but this represented an increase in the preceding twenty years of 7 % only. The war of 1914–18 no doubt had some influence on this slowing up of the city's growth, but decline had already set in before 1911. Since 1921, the population has fallen to 2,891,000 in 1931, and to 2,830,000 in 1936, a decline of roughly 2½%. To sum up: the net result of a century of growth, 1839–1939, can be seen by comparing Figs. 28 and 29.

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* The waterways serving Paris are more fully dealt with in vol. IV, chapter VI, of this Handbook.

† The railways serving Paris are dealt with more fully in vol. IV, chapter IV, of this Handbook.

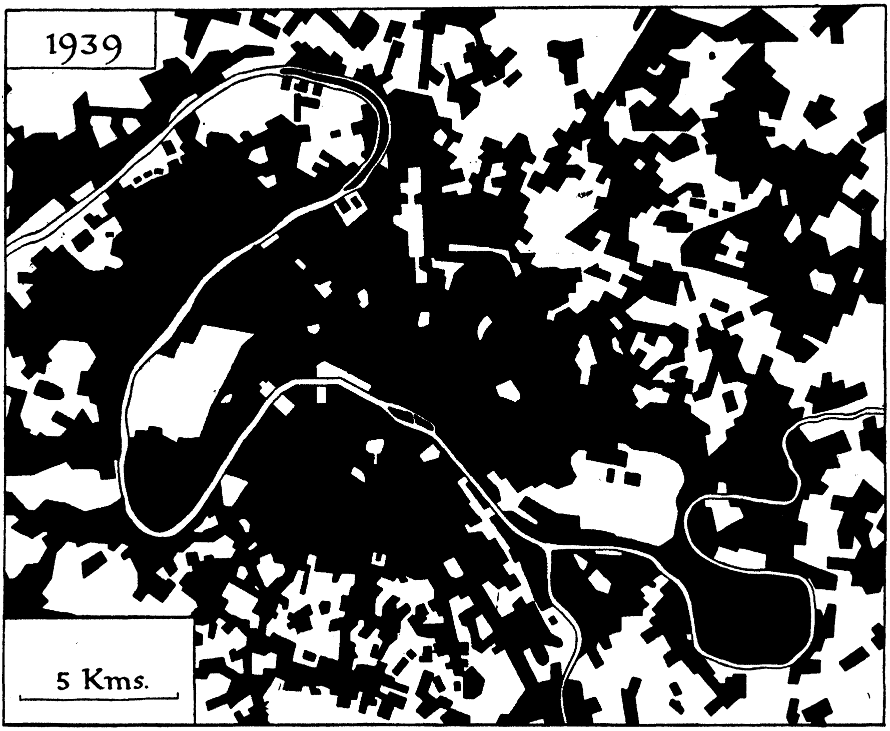

Fig. 29. The built-up area in 1939

Based on A. Demangeon, *Paris; la ville et sa banlieue*, p. 2 (Paris, 1934), and air photographs.

Water Supply

The growth of the city has been accompanied by improvements in the water supply. Until the nineteenth century, the domestic water of Paris was drawn mainly from wells or from the Seine. The latter was raised by pumps, the first of which, La Samaritaine, was set up at the Pont Neuf in the reign of Henry IV. Later in the seventeenth century other pumps were erected at Notre Dame and at Marly for the supply of Versailles. The public fountains were, however, supplied to some extent with water from other sources, e.g. the Belleville aqueduct, said to date from the fourteenth century, and the Arcueil aqueduct, restored by Marie de Medici. These supplies were inadequate for the expanding city, and the first step taken to obtain water from a distance was the construction in 1822 of the Canal de l'Ourcq, which for some years served as an aqueduct as well as a navigable canal. About the same time, attempts were made to utilize artesian supplies at Grenelle and elsewhere, but owing to technical difficulties these wells were abandoned. It was not until the Second Empire that the problem was solved by the engineer Belgrand, who laid the foundations of the present system. The earlier superficial supplies were now used for public and industrial purposes, while domestic water was obtained by tapping adequate and pure supplies at the sources of distant streams; this water was led through aqueducts or underground conduits to reservoirs on the suburban heights. The first to be completed, in 1865, was that from the sources of the Dhuis, a tributary of the Marne, which carries water 114 km. to a reservoir at Ménilmontant. Later, water was similarly brought from the Vanne, an affluent of the Yonne, to Montsouris (173 km.), and from the Arvre, a tributary of the Eure, to St Cloud (120 km.). More recently, supplies for the Montsouris reservoir have been obtained from the Loing and Lunain (73 km.), and the Vanne supplies have been augmented by the Voulzie aqueduct, completed in 1925.

The water from these sources amounts to about 450,000 cu.m. per day, which is still inadequate to meet the demand, especially in summer. Some 300,000 cu.m. have therefore to be pumped from the Seine and Marne, filtered and sterilized at Saint-Maur and Ivry, and either mixed with the other water or retained in separate reservoirs. In addition, very large quantities of river water, distributed through a separate system, are used by public authorities for street cleansing, etc., and by factories, and the maximum amount that can be removed from the rivers is being approached. There have been proposals therefore to seek further supplies from the water-bearing beds in the valley of the Loire, 200 km. south of Paris, which, it has been estimated, could yield 1 million cu.m. a day. It is probable, however, that the cost of the water thus obtained would be greater than that of water from the Seine after it has been filtered and pumped up to the reservoirs. Technical improvements have now made it possible to use artesian water in the outer districts: e.g. the artesian well sunk at Aulnay-sous-Bois in 1933 to a depth of 831 m. yields 5,000 cu.m. a day for the north-western districts.

INNER PARIS

Inner Paris: Population Changes since 1841

The slowing up of the rate of increase and eventual decline in the population of Paris was accompanied by a very rapid growth in the surrounding region, but before dealing with Greater Paris something should be said of the distribution of population within the city limits. The city, that is, the area within the *enceinte* of 1841, plus the narrow military zone around it, the Bois de Boulogne, and the Bois de Vincennes, has an area of approximately 78 sq. km. In comparison with other great cities, this is relatively small, and the average density of population (37,000 per sq. km. in 1931) is consequently high. The administrative County of London, for example, has an area almost four times as great. Towards the end of the century, in 1896, the

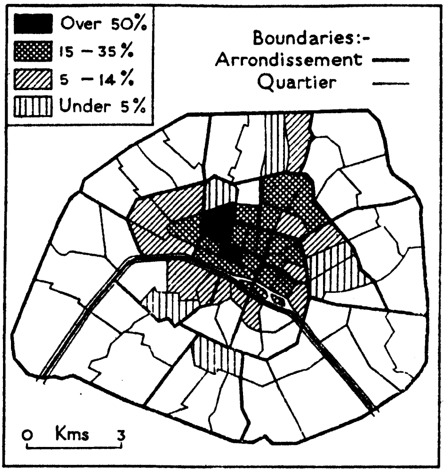

Fig. 30

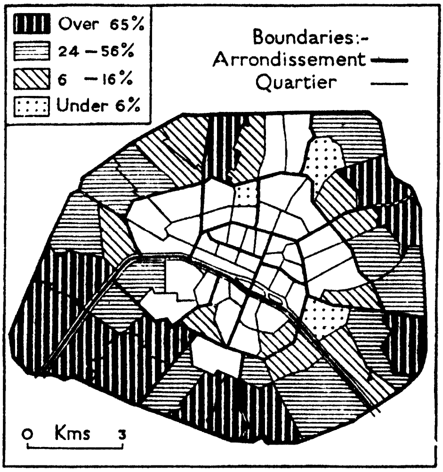

Fig. 31

Fig. 30. The decline of population in the centre of Paris (city), 1896–1931

Based on A. Demangeon, *Paris; la ville et sa banlieue*, p. 21 (Paris, 1934).

The decline in the central districts has been most marked in those which lie to the north of the river, particularly in the arrondissement of La Bourse and in the quartier of Les Halles.

Fig. 31. The growth of population in the outer districts of Paris (city), 1896–1931

Based on A. Demangeon, *Paris; la ville et sa banlieue*, p. 21 (Paris, 1934).

The outer arrondissements of the city have increased considerably in population; more especially those which lie to the south. These areas have a number of light industries, and they also contain the homes of large numbers of the people who work in the heart of the city, many of whom have been displaced from the centre in recent decades. Outstanding among the districts of rapid increase are Clignancourt to the north, Buttes Chaumont and Ménilmontant to the east, Vaugirard and Petit Montrouge to the south, and Auteuil and Passy to the south-west.

corresponding figure was 32,000, so that the increase in density between 1896 and 1931 was 15%. But this increase was not uniform over the whole city.

Two tendencies have been at work. With the continually increasing scale of operations, the heavier industries which had at first tended to concentrate in the northern quarters of the city began to move outwards into the open country, where ample and cheap sites, well placed for river and rail communications, were available. As a result, the Paris region became one of the most important in France for chemical, textile, and engineering works, and in 1931, 20% of French skilled workers were resident in the departments of Seine and Seine-et-Oise. Another tendency has been the so-called 'flight from the centre'. The increasing demand for sites for administrative and commercial offices, banks, large stores, etc. in the centre has led to a rise in land values, and the consequent demolition of old residential property. Moreover, the improved facilities for travel to and from the suburbs have enabled city workers to live at a distance from their work. The insanitary condition of the former densely peopled quarters has also led the municipality to demolish properties and to move the inhabitants to new quarters on the edge of the city. The result of these developments has therefore been to reduce considerably the density of the resident population in the centre of the city, to increase that of the quarters on the periphery, and to bring into existence in the Greater Paris region large industrial and dormitory towns (Figs. 31–33).

Inner Paris: Distribution of Population

Comparing the distributions of 1896 and 1931, it is apparent that Paris can be regarded as composed approximately of three zones with individual characteristics, in which varying tendencies are visible.

The centre of the city, comprising the first seven arrondissements, covers the three historic components of *cité*, *ville*, and *université*. The most densely populated of these arrondissements is the Temple, with over 50,000 inhabitants per sq. km., followed by L'Hôtel de Ville and La Bourse, all on the north bank with 25,000–50,000 per sq. km. These constitute the financial and commercial district, with subsidiary activities such as newspaper production, and have all declined in resident population. This is particularly noticeable in La Bourse, where three of the quarters decreased by more than 35% between 1896 and 1931. It is significant, as showing the piecemeal nature of this outward movement, that the fourth quarter remains one of the most densely populated in the city, Bonne-Nouvelle with 101,500 per sq. km., and that the St Gervais quarter of the Hôtel de Ville had in 1931 the exceptionally high density of 106,900 per sq. km. The fourth of these arrondissements on the north bank is the Louvre, with a lower density of 10,000–25,000 per sq. km. This includes the central markets (Les Halles), and also an area lying between the Champs-Elysées and L'Opéra, which is the centre of 'haute couture', i.e. the production of 'Paris fashions'. The reason for this localization probably lies in the former focusing of court life around the Louvre and the Tuileries. The more popular 'grands magasins' lie between this point and the commercial area. Decline in population has also been very marked here, that of the quarter of the Halles having exceeded 50%. This area is also the home of highly skilled craftsmen, working on a small scale, e.g. costumiers, tailors, gold- and silversmiths, jewellers, and leather workers, who supply the demand for luxury articles.

The portion of the central area south of the river comprises the Panthéon, Luxembourg, and Palais Bourbon. The first two, corresponding to the University and 'quartier latin', had densities of 25,000–50,000 per sq. km.; the third, containing the homes of the aristocratic families of the Faubourg St Germain, of the diplomats in the shadow of the Quai d'Orsay, and of retired officials, is less heavily populated (10,000–25,000 per sq. km.).

The second zone, on the north bank, includes the arrondissements of L'Opéra, L'Enclos-St Laurent, and Popincourt. This is the area of the Gares St Lazare, du Nord, and de l'Est, of the Canal St Martin, and consequently of commercial and manufacturing activity. Thus L'Opéra and Popincourt were two of the three arrondissements which still retained in 1931 densities greater than 50,000 per sq. km. The quartier Rochechouart of L'Opéra had the high density of 90,300 per sq. km., and was the sole area in this zone which increased during this period. The decline elsewhere was largely due to the spread of business houses and luxury shops in this direction from the centre: as a result, one district adjacent to La Bourse, the 'quartier de la Chaussée d'Antin', had decreased by more than 50%. The decline was less marked in Popincourt, which is largely a district of workers' tenements, with a large foreign element.

The third zone is that of the outer ring of arrondissements, mainly industrial and working-class areas, e.g. Batignolles, Montmartre, Chaumont, and Vaugirard, with a density in general between 25,000 and 50,000 per sq. km. This ring is broken at one point in the south-west by wealthier residential districts on the heights of Passy. Save in a few minor districts, the population of this zone increased markedly since 1896. High increases of over 150% occurred in the manufacturing area of Vaugirard, and in Passy; several other quartiers increased by 65–120%. Though not the scene of heavy industries

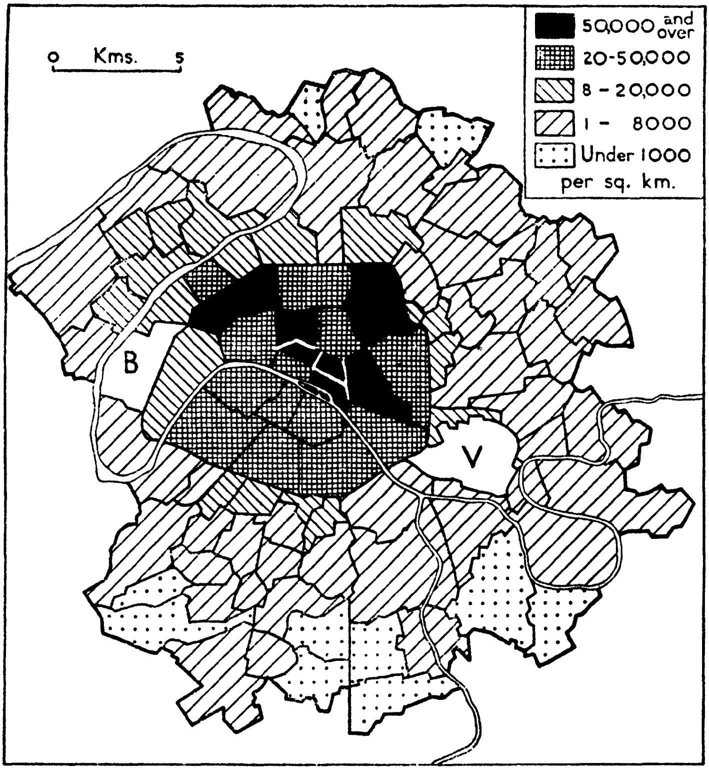

Fig. 32. The density of population in the department of the Seine, 1931
Based on A. Demangeon, *Paris; la ville et sa banlieue*, p. 20 (Paris, 1934).
In the city itself the greatest densities are found to the north of the Seine. In the remainder of the department the principal area of high density lies to the north-west on both sides of the Seine—at Neuilly, Clichy, Puteaux, Courbevoie and Colombes. This distribution largely reflects the distribution of industry in Greater Paris. B, Bois de Boulogne; V, Bois de Vincennes.

similar to those of Greater Paris, these exterior arrondissements have a variety of industries, such as the furniture factories of the Faubourg St Antoine (Batignolles), the boot factories of Belleville, and the light metal works of Charonne, apart from those more directly associated with the railways. These areas are also the homes of those displaced from the centre who work daily in the city and the west.

GREATER PARIS

Growth of Population

The boundaries which should be assigned to Greater Paris are not easy to determine precisely. During discussions in 1932 on future growth it was declared to consist of the department of the Seine, those communes of Seine-et-Oise and Seine-et-Marne within a radius of 35 km. of Paris, and a large proportion of L'Oise, forming an area

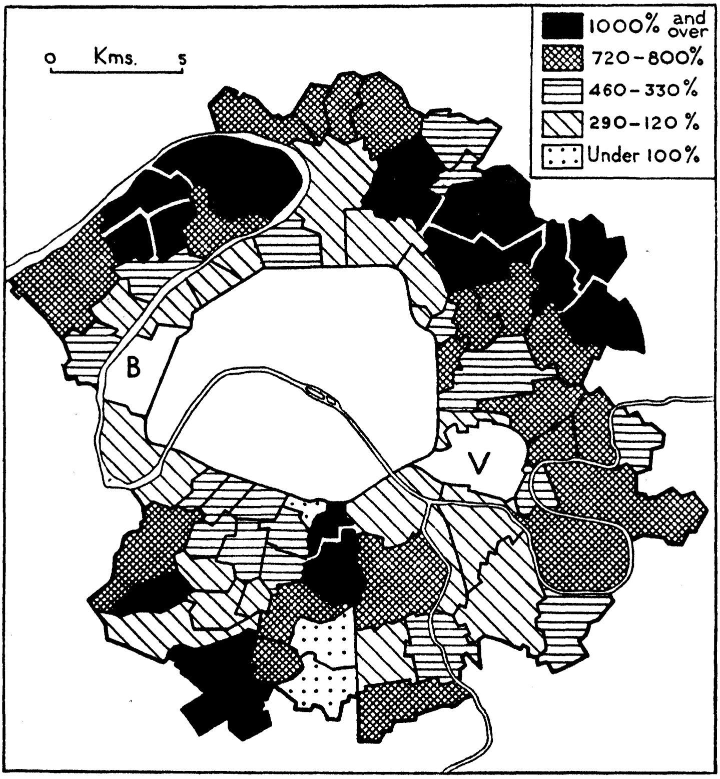

Fig. 33. The growth of population in outer Paris, i.e. the department of the Seine outside the city limits, 1876–1931

Based on A. Demangeon, *Paris; la ville et sa banlieue*, p. 22 (Paris, 1934).

While the increase has been fairly general, it has been most marked to the north and north-east, and in some areas to the south. It will be noted that these areas lie mostly away from the city limits, for by 1876 the communes immediately adjoining Paris had already begun to experience a growth of population spreading outward from the city. These more remote communes, such as Gennevilliers and Colombes to the north-west, La Corneuve, Le Bourget, Drancy, Aubervilliers, Pantin, Bobigny and Villemomble to the north-east, and Gentilly, Villejuif and Sceaux to the south, had very small populations in 1876, and with the spread of industry in recent decades their growth has appeared all the more striking.

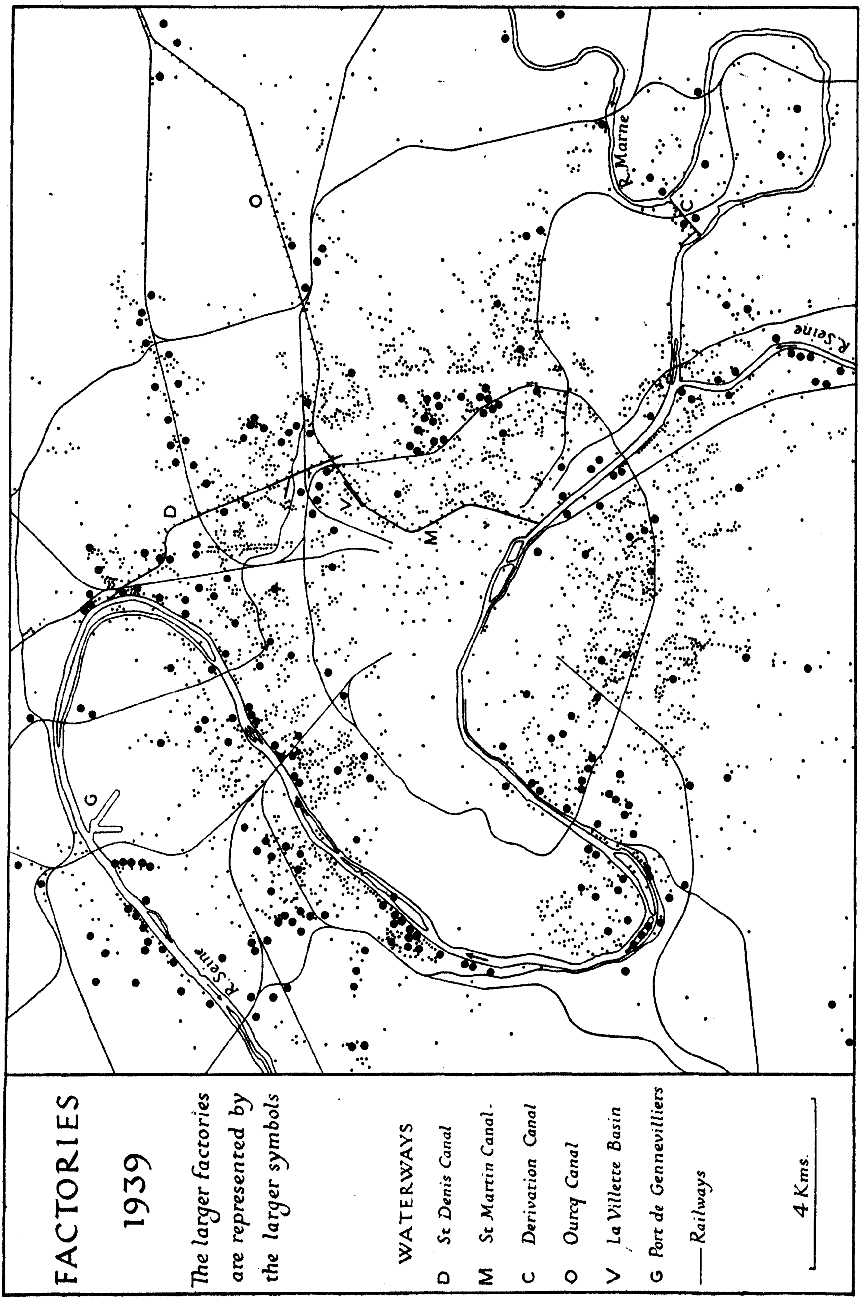
FACTORIES
1939
The larger factories are represented by the larger symbols
WATERWAYS
D St Denis Canal
M St Martin Canal.
C Derivation Canal
O Ourcq Canal
V La Villette Basin
G Port de Gennevilliers
— Railways
4 Kms.
R. Marne
R. Seine
R. Seine
O
D
V
M
C
G

Fig. 34

of approximately 5,000 sq. km. with a population of 6,300,000. This deliberately included areas not then dominated by Paris: but whatever the exact boundaries, there is no doubt that the whole of the department of the Seine falls within Greater Paris, and recent censuses show how rapid has been the growth of its population. In 1881 the department, excluding Paris, had 530,000 inhabitants: this figure, by 1901, had nearly doubled (956,000), and trebled by 1921 (1,506,000); by 1936 it was 2,133,000, comparable with that of the city itself, with an average density of approximately 5,300 per sq. km. (Figs. 32, 33).

Development in these outer regions has spread along the lines of communications, absorbing long-established towns, and generally repeating the characteristics of the city's quarters thus extended—industrial areas on the lower, more accessible land, and residential suburbs on the higher. Four industrial areas are conspicuous:* (1) the north and north-eastern, comprising St Denis, St Ouen, Aubervilliers, and Pantin; (2) the west and north-western, spread along the winding valley of the lower Seine (Fig. 34); (3) the south-eastern, in the upper Seine valley as far as Choisy and extending west to the valley of the Bièvre; and (4) the south and south-western, adjoining the city limits in the Gentilly, Vanves, and Arcueil areas, and extending westwards to Issy-les-Moulineaux.

North and North-eastern Industrial Suburbs. The first of these is of considerable importance. The basis of its development has been the St Denis canal, which, via the Canal de l'Ourcq, brings Pantin on the east within the area. The important industries of St Denis produce locomotives and wagons, engineering and electrical equipment, acids, fertilizers, soaps, etc., and along the Seine ships and barges are built. St Ouen to the south has a number of very diversified industries, generally of a lighter character—copper and aluminium

* For details of industry, see pp. 177–9.

Fig. 34. The industries of Greater Paris, 1939

Based on (1) *Carte Industrielle de la Région Parisienne*, 1/20,000, 4 sheets (Paris, 1933); (2) *Carte Industrielle de la Grande Banlieue*, 1/320,000 (Paris, 1927); and (3) official sources.

The line of the 1841–5 fortifications is represented by the circular line of railway, except to the east where it is marked by a belt devoid of factories. Thus to the north, north-west and south-west most of the factories lie outside the city limits, while to the east and south they lie more within them. It is clear that the location of the larger factories is much more closely related to the river and to the railways than to the canals. The Port de Gennevilliers is a barge port of recent construction, in which the two existing docks will be followed by others, the whole system being designed to serve the growing industries of Colombes, Gennevilliers and Argenteuil.

goods, tinned foods, furniture and pianos, gloves from skins. The industries of Aubervilliers, La Courneuve, and Pantin are predominantly chemical, ranging from oil refining to perfumes and toilet articles, while the by-products of the Villette slaughterhouses are used for the manufacture of tallow, margarine and leather. In these districts the available labour has attracted many minor factories, producing, for example, glass and pottery at St Denis, and sewing cotton and tobacco at Pantin. These five communes form a block of over 240,000 inhabitants, which increased between 1921 and 1936 by approximately 15 %, despite a marked decline in the depression following 1931. This manufacturing area is spreading north-eastwards towards the rail and air centre of Le Bourget, competing for the available land with the builders of housing estates, who have been particularly active around Drancy (Figs. 28, 35).

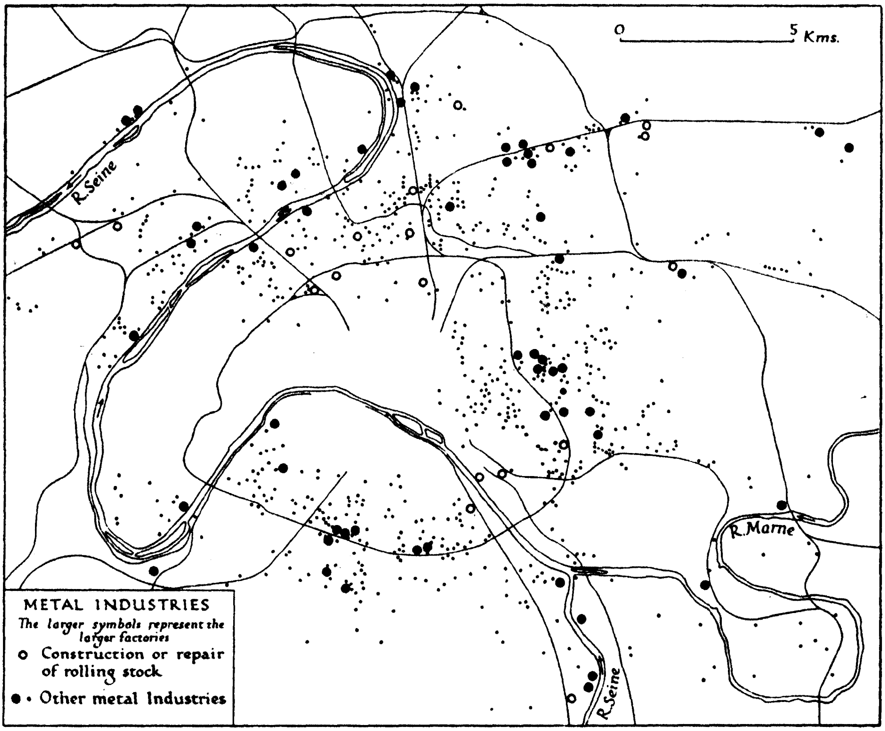
0 5 Kms.
R. Seine
R. Marne
R. Seine
METAL INDUSTRIES
The larger symbols represent the larger factories
o Construction or repair of rolling stock
● • Other metal Industries

Fig. 35. The metal industries of Greater Paris, 1939

Based on (1) *Carte Industrielle de la Région Parisienne*, 1/20,000, 4 sheets (Paris, 1933); (2) *Carte Industrielle de la Grande Banlieue*, 1/320,000 (Paris, 1927); and (3) official sources.

These include mechanical and constructional engineering and a variety of metal manufactures. The majority of these factories lie to the east and south.

West and North-western Industrial Suburbs. The second great industrial group is in the west and north-west, established along the valley of the Seine. Immediately west of Paris is the centre of the French motor and aircraft industries, with the Citroën works at Grenelle and the Renault at Boulogne-Billancourt (Plate 11). Here expansion has been rapid, the population of the latter commune having increased from 68,000 in 1921 to 97,000 in 1936. Farther downstream, on both sides of the valley, extends a string of industrial concentrations combining the engineering and manufacturing activities of their neighbours to the north and south: Suresnes, Puteaux (armaments), Courbevoie, Levallois-Perret (motors and aircraft), Clichy (gas works and oil refineries along the river), and Asnières (chemicals

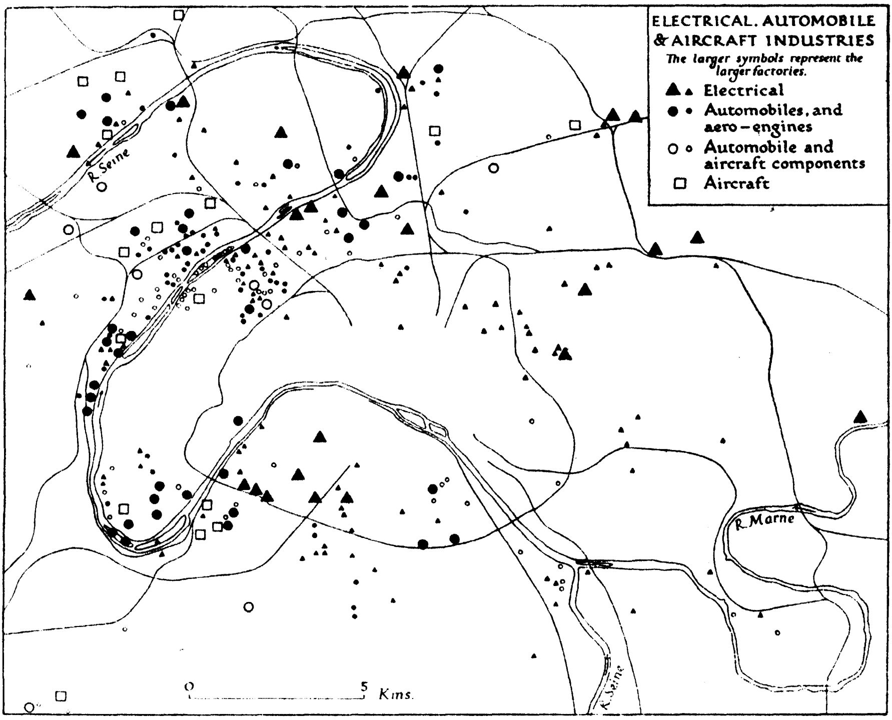
ELECTRICAL. AUTOMOBILE & AIRCRAFT INDUSTRIES
The larger symbols represent the larger factories.
▲▴ Electrical
●• Automobiles, and aero-engines
○∘ Automobile and aircraft components
□ Aircraft
R. Seine
R. Marne
R. Seine
0
5 Kms.

Fig. 36. The electrical, automobile and aircraft industries of Greater Paris, 1939

Based on (1) *Carte Industrielle de la Région Parisienne*, 1/20,000, 4 sheets (Paris, 1933); (2) *Carte Industrielle de la Grande Banlieue*, 1/320,000 (Paris, 1927); and (3) official sources.

The concentration of these industries to the north-west and south-west is clear. Figs. 35 and 36 are complementary, and show between them all the metal-using industries. Fig. 35 shows mainly old-established industries; Fig. 36 shows newer industries.

and foodstuffs). The population of this zone exceeds 380,000, having increased by approximately 20% between 1921 and 1936. Expansion has progressed in the loop of the Seine towards Argenteuil, notably around Gennevilliers, where there is a large electric power station fed by water- and rail-borne coal. Interlaced with these and standing on the higher ground are residential suburbs, e.g. Neuilly, Nanterre and Colombes (Fig. 36).

South-eastern Industrial Suburbs. The industrial areas are repeated on a somewhat smaller scale in the south-east along the Seine valley through Ivry and Vitry, where there are large power stations and gasworks. Vitry, however, still continues to grow flowers for the city markets, whilst Choisy manufactures linoleum, paper and china. Here live a population of some 120,000.

South and South-western Industrial Suburbs. Another industrial belt extends to the west, skirting the city limits as far as the Seine; its features are the tanneries and laundries in the valley of the Bièvre around Gentilly which perpetuate the early use made of its waters, and Issy-les-Moulineaux, with its power stations, munition and cement works, breweries, and tobacco factories. This sector has a population of over 200,000. From its western end a series of small towns continue southwards over the broken plateau, and house thousands who work daily in Paris; these towns, interspersed with market gardens, carry the boundaries of Greater Paris beyond Sceaux. The recent electrification of the railway line serving this area may be expected to stimulate the further development of dormitory estates.*

Eastern Residential Suburbs. In this circuit of Paris one sector has so far been omitted, the eastern, which has become the predominantly residential area of the outskirts, beyond the factories along the eastern border of the city. Extending over the gentle and formerly wooded hills north of the Marne as far as the boundary of the department are numerous residential towns such as Vincennes, Montreuil, and Fontenay-sous-Bois, with islands of orchards, vegetable and flower gardens, scarcely touched by industrial development. Nearly a quarter of a million people have their homes in this sector of Greater Paris. Similar expansion has taken place along the valley of the Marne, the tide of building progressing from one loop of the river to the next as far as Nogent. The peninsula between the Seine and the Marne is occupied by the working-class suburb around Alfortville comprising some 75,000 inhabitants. In the first great loop of the Marne is the garden city of St Maur (57,000); in the next Champigny (27,500), and again in the next Nogent and Le Perreux (together 45,000), developments all consequent on the breaking up of large estates towards the end of the last century. Market gardening is still carried on to some extent, but except around Alfortville and Maisons-Alfort there has so far been little industrial development.

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* See vol. IV, chapter IV, of this Handbook.

Regional Planning

This development of the Paris region has been haphazard and unco-ordinated. Factories and housing estates are intermingled: the new quarters of the expanding towns are often unprovided with adequate roads, drainage, or water supply: valuable agricultural land has been built over: and natural amenities have been destroyed. This has resulted from the lack of a central authority, the constituent communes being largely independent and without the means to develop in an orderly way. In 1932 a law prescribing a 'projet d'aménagement' for the whole region was promulgated. A general directing plan was drawn up and presented in 1934, with which the local schemes were to conform. It covered the lay-out of the main roads, open spaces, the use of the land and the regulation of buildings, public services, and the protection of sites. The scheme for communications provided for five radial motor roads in conjunction with an outer ring at a distance of some 20 km. from the centre.* For several reasons, among which the conflict of local interests is not the least important, progress with the scheme has been slow.

Attempts have also been made from time to time to check the continued concentration of industries, particularly aircraft works, in the Paris region, as this was considered to be strategically dangerous. In 1931 a fund was instituted to assist the removal, if required by the Air Ministry, of aircraft factories to a particular zone, and the scope of this measure was afterwards enlarged. Three years later the Departments of National Defence ruled that works thereafter established in the region should in general be excluded from their supply lists, and in 1938 official approval was required for the siting of new munition factories. It does not appear that this movement had made any considerable progress before the outbreak of war, one obstacle being the disinclination of the workers to migrate with the factories.

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* See vol. IV, chapter V, of this Handbook.

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(2) An authoritative history of Paris is M. Poete's *Une Vie de Cité, Paris de sa naissance à nos jours*, 3 vols. (Paris, 1924–31).

A useful short account in English is H. Belloc's *Paris* (London, 1900).

(3) C. O. Zieseniss, 'Les projets d'aménagement de la région parisienne', *Annales de Géographie*, vol. XLIX, pp. 28–34 (Paris, 1940).

A detailed study of planning projects in the Paris region will be found in G. Bardet's 'Vingt ans d'urbanisme appliqué en France', *L'Architecture d'aujourd'hui*, vol. X, pp. 1–80 (Paris, 1939).

(4) The series of maps produced by the *Société de Documentation Industrielle* includes two very interesting maps of Paris and its satellite towns: *Carte Industrielle de la Région Parisienne*, 1/20,000, 4 sheets (Paris, 1933); *Carte Industrielle de la Grande Banlieue* (*Seine-et-Oise*, *Seine-et-Marne*), 1/320,000, with insets of Argenteuil, Montereau, Versailles, Corbeil, Persan-Beaumont, and Melun, 1/20,000 (Paris, 1927). See vol. I, p. 249, of this Handbook. A detailed map showing the density of population in Paris and the Paris region in 1931 can be found in the *Atlas de France*, Plate 72 (Paris, n.d.).

Chapter III

AGRICULTURE

Introduction: Wheat: Other Cereals: Root Crops: Minor Crops: Wine and other Beverages: Market Gardening: Livestock: Working Population: Land Tenure: Legislation: Forests: The Vichy Regime: Bibliographical Note

INTRODUCTION

France is a country highly favoured by nature from the point of view of agricultural production. Of its working population, 35% are engaged in agriculture, and the urban areas are to a great extent fed by home-grown food. A map showing density of population exhibits a remarkable continuity in distribution; only in the highest parts of the Alps and the Cévennes and on the sandy forested stretches of the Landes are there any considerable empty areas. Cultivation penetrates far into the highlands of the Alps, the Vosges and the Jura, following the terraces of the river valleys; it covers the lower platforms of the Central Massif; it renders return, however meagre, even to the dense population of the poor acid soils of Armor in Brittany. If pastoral pursuits and forestry are included, there is hardly a corner of the country left unproductive.

Climate, soil and relief have greatly contributed to this high degree of land utilization, and to these factors must be added the late development of French industry. Both climatic and soil conditions present considerable variety. Exposure to Atlantic winds precludes the harsh winter conditions of more northerly and more continental areas, so that the sheltered bays of the Breton coasts are able to grow early vegetables for export. The extension southwards to Mediterranean shores and the protection afforded by the Cévennes and the Alps against northerly winds give to France a share in Mediterranean products, and have made possible the large-scale cultivation of *primeurs*; yet, except in the Rhône delta and the eastern-facing valleys of the Pyrenees, the summer drought is not sufficiently prolonged to make cultivation entirely dependent upon irrigation. In the east of the country there is an approximation to continental conditions of agriculture, with the cultivation of maize, hops and tobacco in the lowlands. Finally, the ample development of mountain and plateau in the south and south-east with Atlantic-facing slopes is the basis for pastoral and forest industries.

A generalized view of the soils of France is difficult, partly because of the variety of soil types within a small area, partly because centuries of intensive cultivation, marked even by the transference of soil from one locality to another in barges, has made the present distribution in some areas almost artificial. Despite this, certain predominant soil groups are apparent. The most important contrast is between mountain and lowland soils. The former vary from the rich soils of the volcanic districts of the Central Massif through the moderately fertile calcareous soils of the Jura to complete poverty in parts of the Alps and Pyrenees. Acid soils, too inaccessible for economic liming, must be content to produce such 'poor man's crops' as rye and buckwheat. The lowland soils are equally variable—from the poor sands of the Landes and the sands underlain by clay of the Sologne to the rich alluvial deposits in the river valleys. The prevalence of limestone and chalk ensures large areas of warm, well-drained land; the distribution of *limon* on these high, limestone plains of northern France provides a fairly heavy, loamy soil, suitable for wheat, sugar beet and other root crops. Sunny, south-facing slopes on well-drained limy or gravelly soils produce vines as far north as the river Aisne (Fig. 46). Alluvial river terraces, especially when covered with loessic deposits, are intensively cultivated throughout the land. Ill-drained valley bottoms, moorland, coastal marshes and mountain shoulders or 'alps' provide meadow and permanent pasture.

Upon these diverse soils the intensive cultivation of the small farmer has in many places developed a specialized agriculture, but taking the country as a whole, the yield per hectare is a moderate one for western Europe. It is considerably lower than the yield in such countries of intensive peasant farming as Holland, Belgium and Denmark, and also appreciably lower than the yield in the United Kingdom and Germany, as shown in the following table:

	Yield (quintals per hectare) 1933–7 average			No. of livestock per 100 ha. of cultivated land, permanent meadow and pasture, 1937	
	Wheat	Barley	Oats	Cattle	Pigs
France	15·3	14·3	14·0	45	20
United Kingdom	22·8	20·6	20·4	48	36
Germany	22·2	20·9	19·9	71	83
Belgium	26·5	26·1	26·5	88	52
Holland	29·6	28·7	23·9	109	71
Denmark	31·3	28·4	25·9	93	111

From *Annuaire Statistique, 1938* (Paris, 1939), which gives *Tableaux Retrospectifs* for a number of countries.

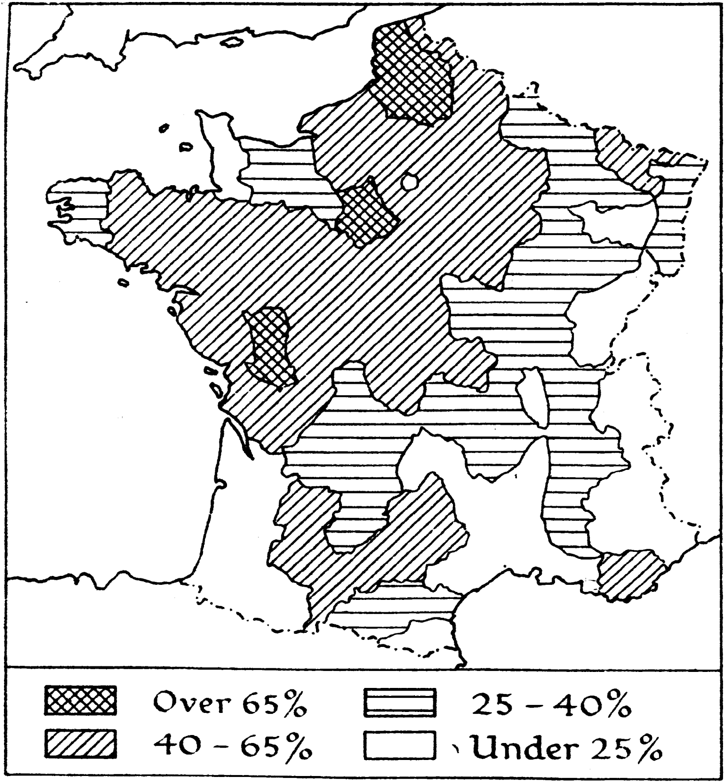


Fig. 37. Percentage of arable land in each department, 1938

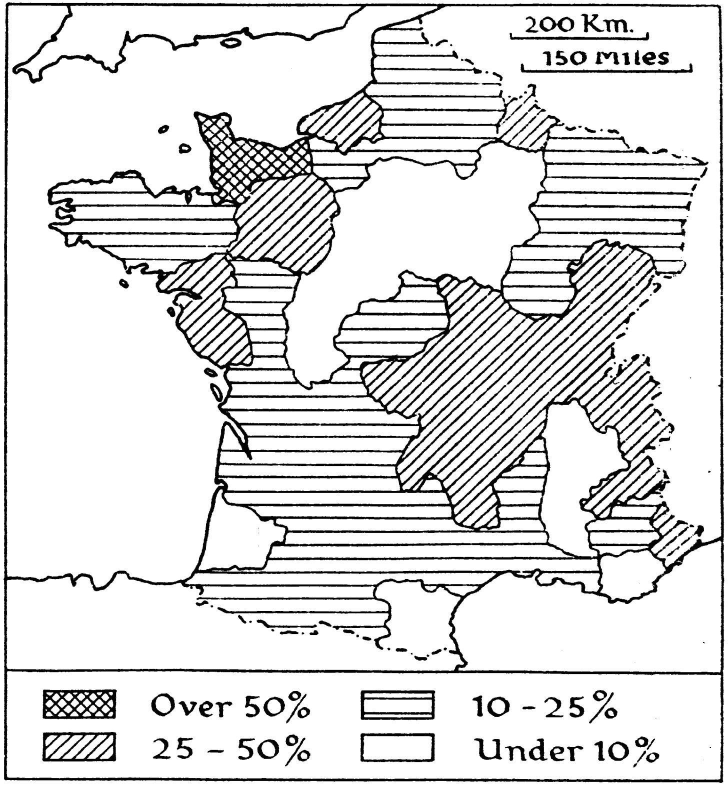


Fig. 38. Percentage of permanent pasture and natural grassland in each department, 1938

Statistics upon which these and succeeding maps of agricultural distributions are based were taken from *Statistique Agricole Annuelle* (Paris, annually, latest edition refers to 1938).

A comparison of the densities of livestock likewise reflects the different agrarian economies of these countries. Figs. 37 and 38 show the percentages of arable land and grassland respectively in each department in 1938. The proportion of the total agricultural land devoted to each type of farming activity is shown in Fig. 39. The adjoining table summarizes the agricultural production of France.

Summary of Agricultural Statistics, 1938

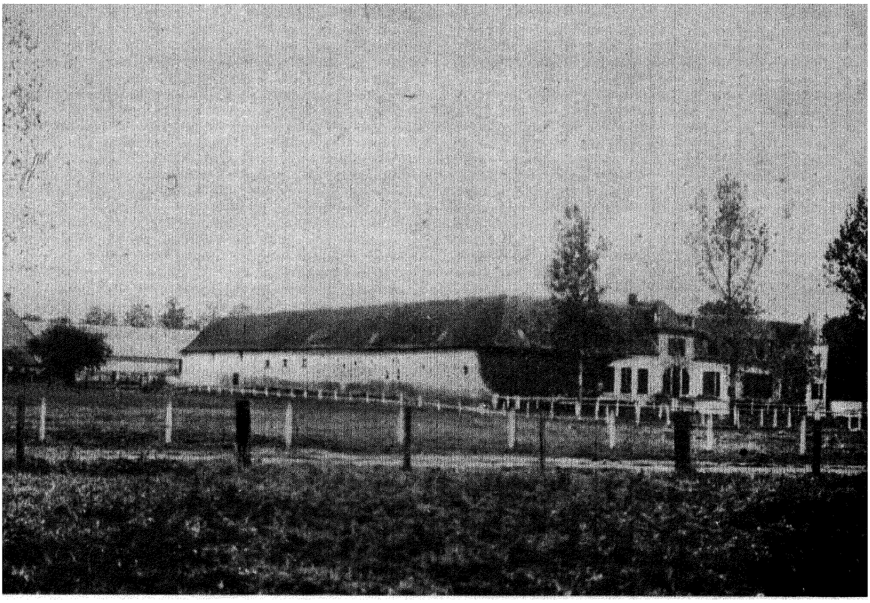
	Hectares	Quintals (except where otherwise stated)
Cereals:		
Wheat	5,050,199	98,010,002
Oats	3,245,257	54,574,380
Barley	759,223	12,907,804
Buckwheat	261,366	2,422,894
Rye	631,096	8,111,314
Maize	340,290	5,786,067
Millet	9,212	88,266
Other products:		
Potatoes: New	113,235	9,266,727
Others	1,425,000	173,145,000
Sugar beet	319,000	79,800,000
Fodder beet	976,000	382,600,000
Flax	38,000	238,000
Tobacco	18,100	33,166,280 kg.
Hemp	3,802	41,873
Grapes	1,567,000	60,300,000 hl.
Hops	1,600	21,300
Cider	—	34,600,000 hl.
Market gardening	437,000	—
Olives	—	333,000
Livestock:	Numbers	
Cattle	15,622,000	
Sheep	9,872,000	
Pigs	7,126,000	
Horses	2,692,000	
Milk	133,241,000 hl.	

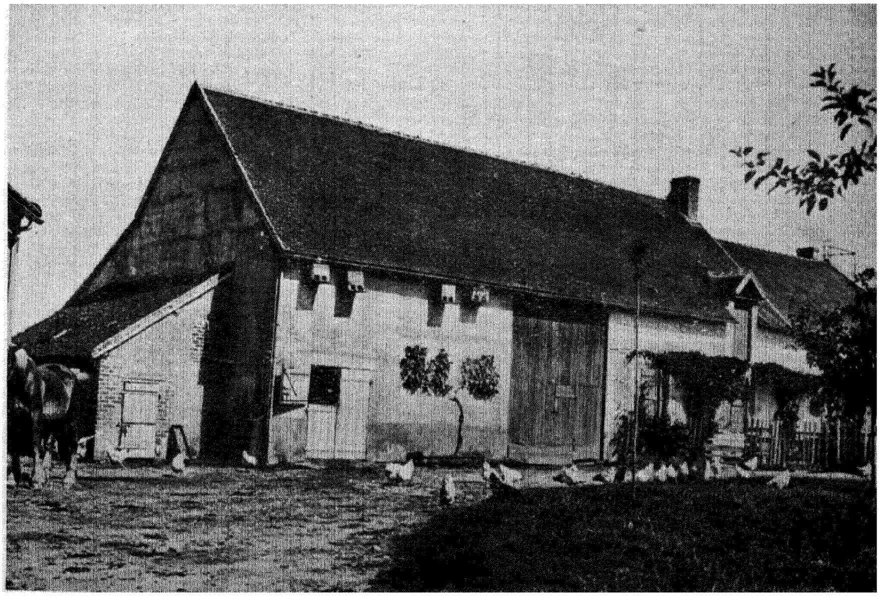
The source of this and of other tables in this chapter (except where otherwise stated) was *Statistique Agricole Annuelle* (Paris, latest edition refers to 1938).

WHEAT

In few parts of France are to be found the cool damp conditions that preclude the successful growing of wheat, as in western Britain, and as a result the area under wheat is half that under all cereals. The age-long localization of grain varieties enables most soils that are cultivated with intensive assiduity to be used.

The more important wheatlands (those with an average departmental production of over 2½ million quintals per annum) are situated in the departments to the north and east of Paris (Fig. 40). These areas





Plates 12, 13. Farms in the Bourbonnais

The Bourbonnais lies on the northern edge of the Central Massif between the rivers Cher and Allier. Plate 12 (above) shows the large establishment typical of a former social system; the fifteenth-century *Maison du Maître* lies adjacent to the dwellings of the *métayers* on the left. It is more common for the former to have a separate existence as a château. Plate 13 (below) is of a small farm more typical of modern French agriculture.

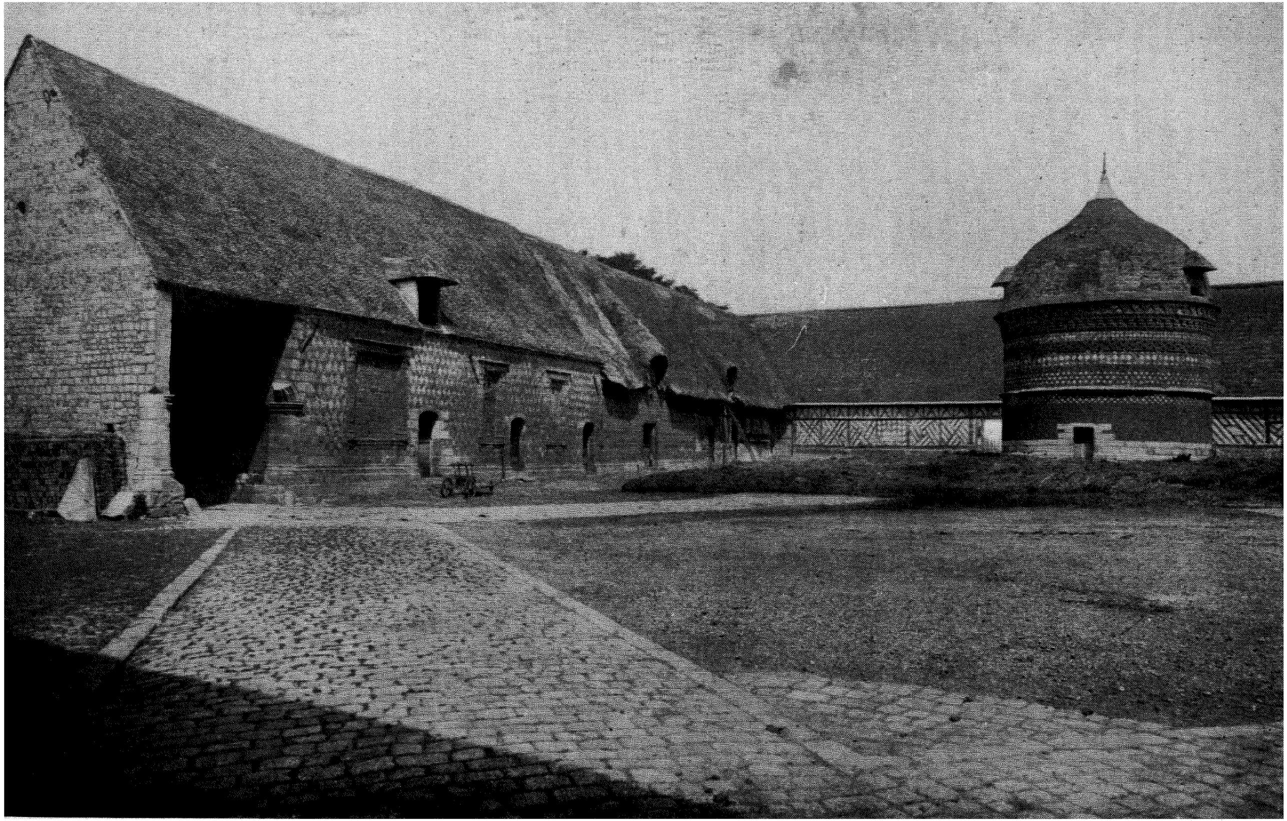


Plate 14. Courtyard of a farm near Varengeville (Seine-Inférieure)
The spacious outbuildings are characteristic of old farms on the chalk lands of northern France.

mainly comprise low limestone plateaux providing a well-drained subsoil covered with fertile surface loams. Wheat is also cultivated intensively on the alluvial terraces of the Seine and its tributaries (Plate 15). Districts with over 15·5 quintals per hectare stretch from the Seine valley to the Belgian frontier. Other areas of high yield are Languedoc, especially on the lava soils, the basins of the middle Rhône, the lower Charente region in northern Aquitaine, and the upper valleys of the Mayenne and the Sarthe. Next come the coastal plains of western Brittany, Normandy, the Alsatian terrace lands, and the terraces of the lower valleys of the Alps and Pyrenees. The mountainous regions, together with the coastal regions of the Landes and the Mediterranean, are least important, although even there small areas of relatively level land are utilized (Plate 19).

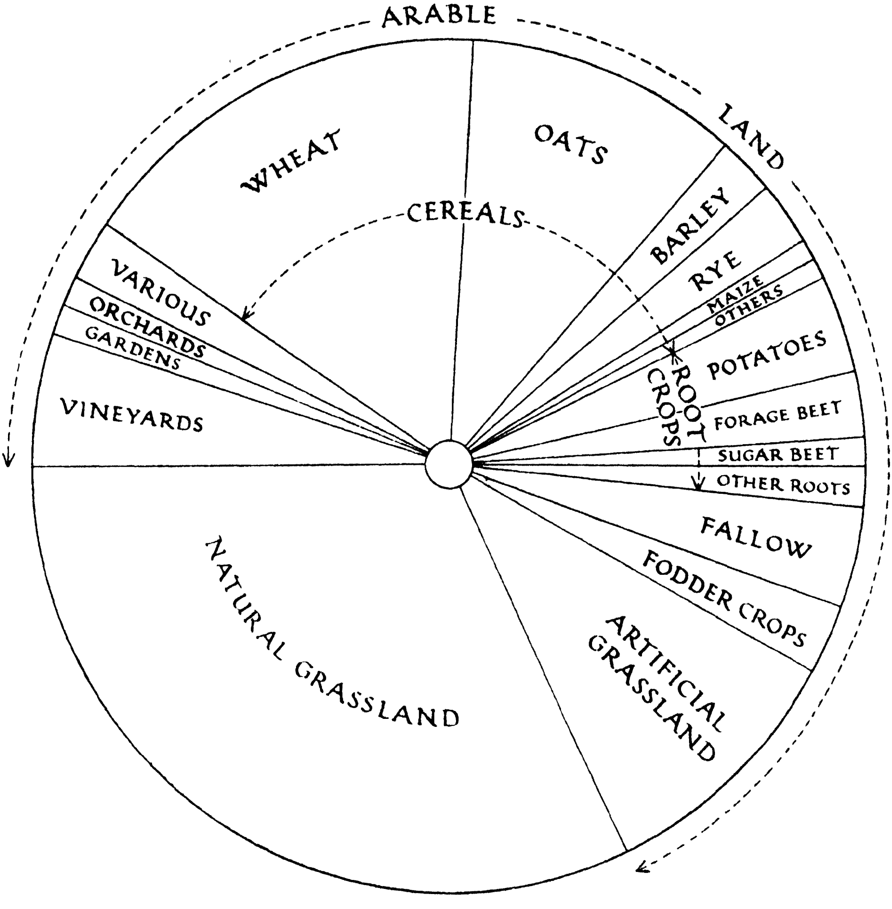


Fig. 39. Utilization of agricultural land, 1938

The area under wheat decreased towards the end of last century as less favourable lands went out of cultivation. Between 1914 and 1918 the decline was rapid due to the ravaging of the north-east by war. Since 1919, the gradual recovery of these areas has been balanced by a steady decline in the south and in other districts such as Normandy, where wheat occupied in 1933 only two-thirds as much land as in 1913. The latter decrease was due in part to the competition of dairy farming. As a result, the total area under wheat has remained relatively constant since 1923 but with a slight tendency towards decline. There has been some restriction in wheat growing as part of a general policy

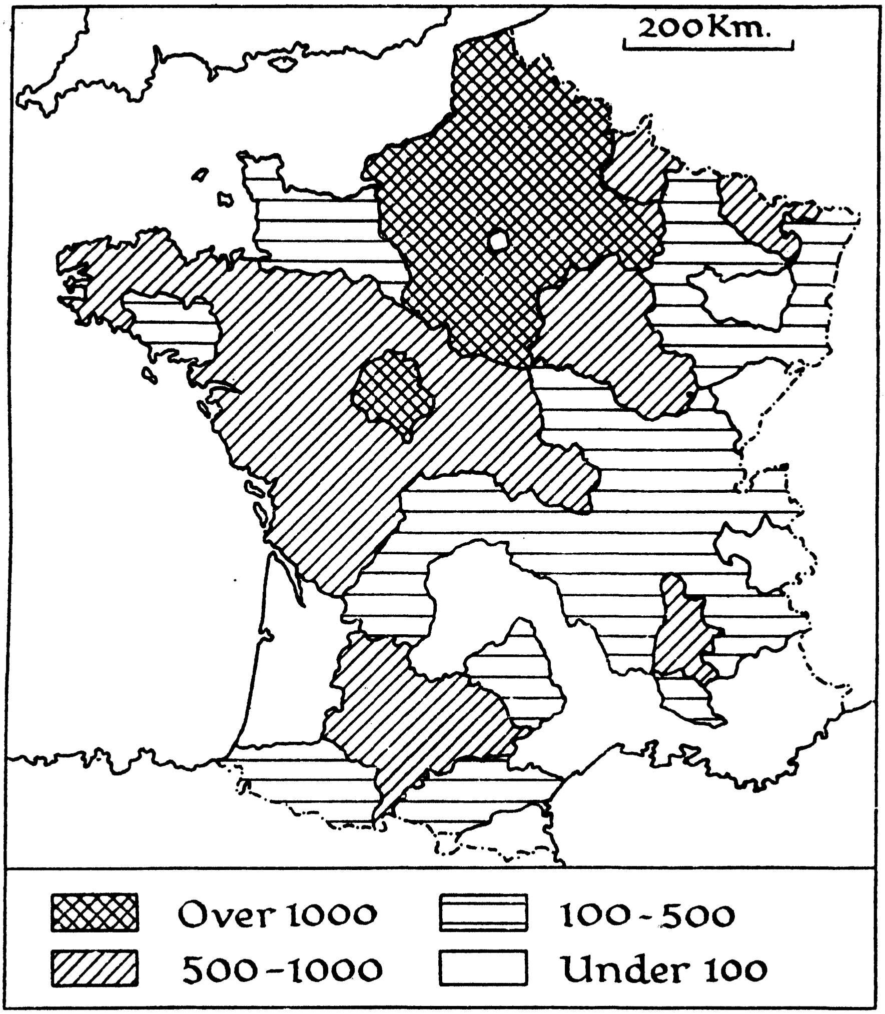


Fig. 40. Production of wheat in quintals per 100 ha. of each department, 1938

of avoiding over-production. In 1933, producers were put on an area quota based upon an average of the three preceding years. The yield per hectare, although obviously masked by good or bad harvests, has

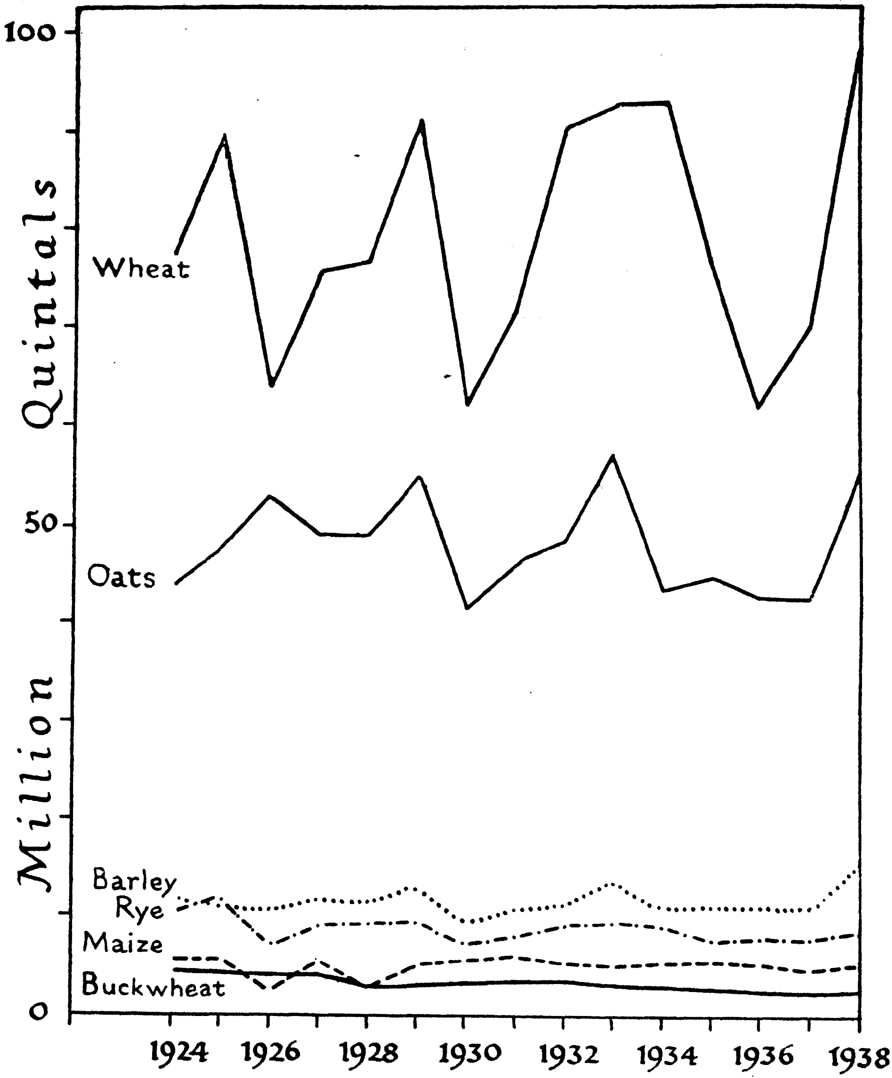


Fig. 41. Production of cereals, 1924–38

risen steadily, partly because less favourable lands have gone out of cultivation and partly because of an increased use of fertilizers (chiefly of superphosphates, potash, basic slag, etc.). Thus, although the area under wheat has declined by about 20 % since 1913, the increased yield has resulted in six harvests (those of 1925, 1929, 1932, 1933, 1934 and

1938) being substantially above the 1913 figure. The harvest of 1938 produced the record high yield of 19·41 quintals per hectare. There is considerable fluctuation however (Fig. 41), and the poor harvests of 1926, 1930, 1931 and 1937 were considerably less than that of 1913. The improvement in the standard of living since 1918 has necessitated a considerable yet fluctuating import of grain, whereas before 1914 there were several years with a small surplus for export (Fig. 42). No export surplus occurred again until 1933.

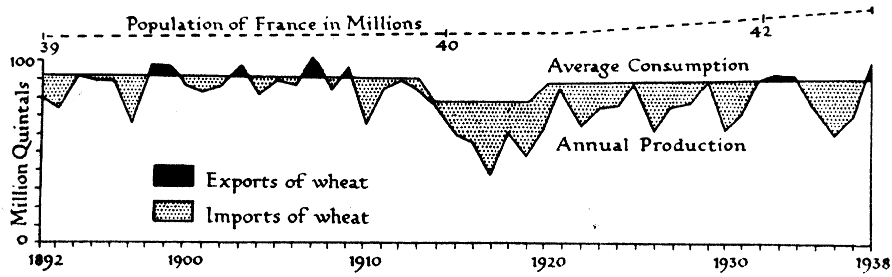


Fig. 42. Production and consumption of wheat, 1892–1938

OTHER CEREALS (Fig. 41)

Oats constitute the second largest crop in French agriculture and about 54 million quintals were produced in 1938. This was concentrated in the northern half of the country where damper conditions are more favourable. It is grown almost entirely for fodder and is used in the horse-rearing and cattle-producing areas of Brittany, Normandy and northern France generally.

Barley. The total yield of this cereal in 1938 was nearly 13 million quintals. It is grown mainly in the northern parts of the country beyond the area of intensive wine production; Alsace, too, provides high-quality barley. But it is not an important crop in France, as the consumption of beer is relatively low except in the north-east. Most of the crop is consumed locally as fodder.

Rye, totalling 8 million quintals in 1938, is grown on the poor lands of the Central Massif, on the sandy soils of the Landes, on the poor granite soils of Morbihan in south Brittany, and in the eastern Pyrenees. Cultivation in the Moselle area is associated with the production of straw for hat making.

Buckwheat is grown in regions of relative difficulty where the soil is poor or the land hilly. In 1938, it totalled 2,400,000 quintals, and it is cultivated chiefly in Brittany where it provides flour for the peasant population. It is also grown for the same purpose in the Central Massif and in the Morvan.

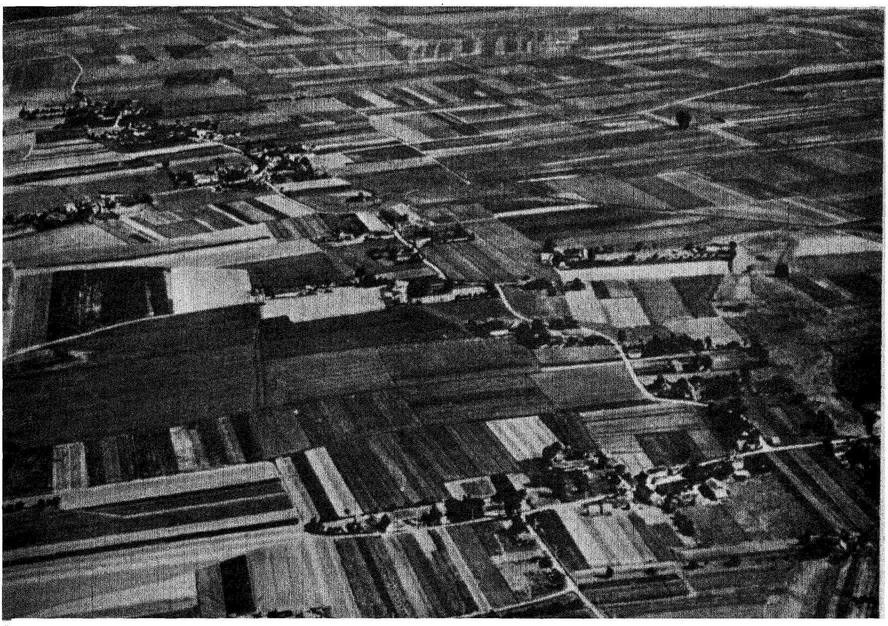


Plate 15. Arable farming in Beauce

A photograph taken east of Châteaudun, showing the broad, flat, almost treeless expanse of intensively cultivated land.

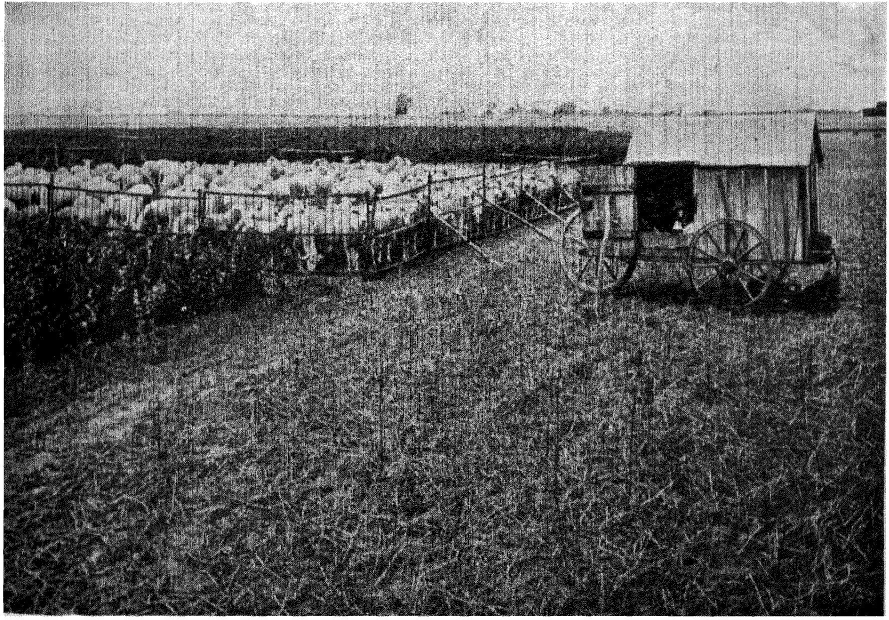


Plate 16. Sheep-folding in Beauce

As in Britain, sheep folded on stubble or roots are an essential part of the arable farming economy of limestone regions such as this.

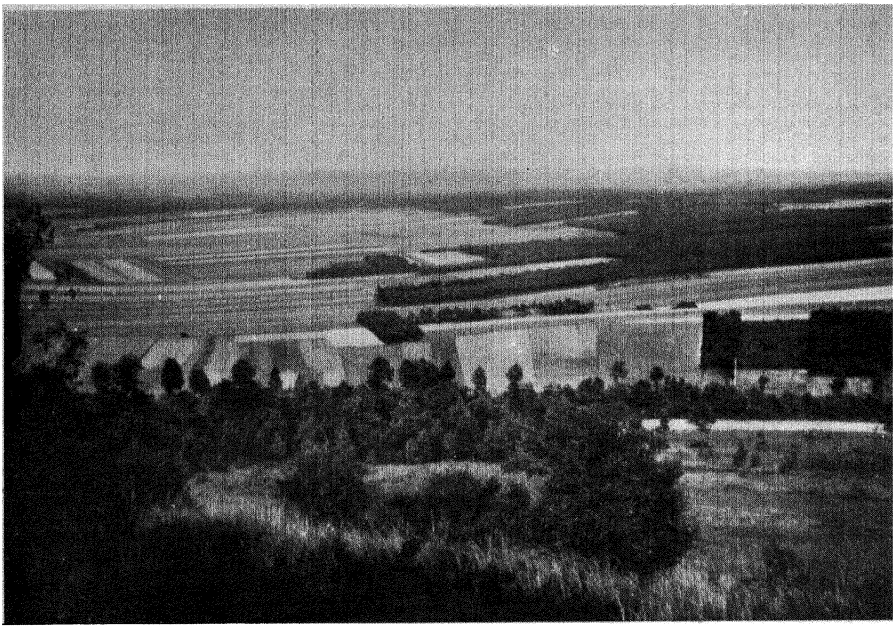


Plate 17. The Champagne Plain

View eastwards from Mt Aimé, about 30 km. west of Châlons-sur-Marne. The level or gently undulating plain is between 100 and 150 m. above sea level. Hedgeless cultivated fields alternate with strips and rectangular blocks of planted pines.

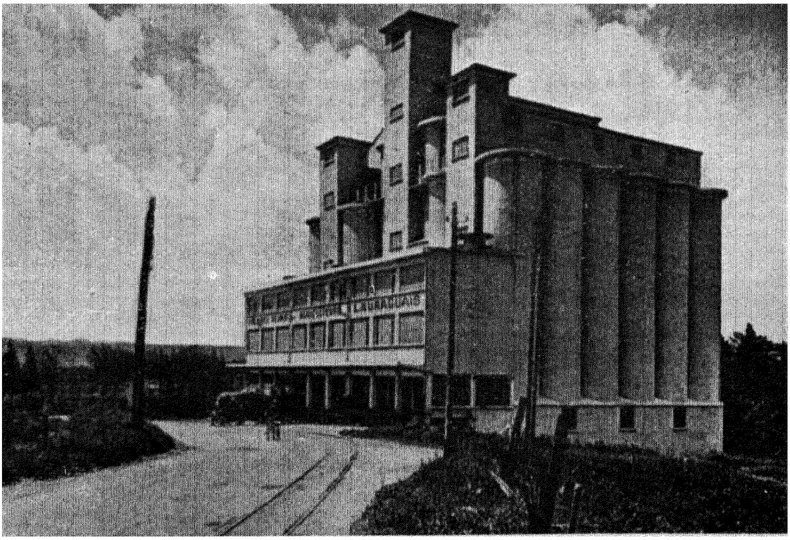


Plate 18. Grain elevator near Castelnaudary (Aquitaine)

France is largely self-supporting in grain, and in consequence large quantities are stored at inland towns and not necessarily at the ports, as in Britain. The majority of elevators are owned by co-operative societies, in this case by the *Greniers réunis des agriculteurs Lauraguais.*

Maize yielded 5¾ million quintals in 1938, and it is important only in the south-west where conditions are moist, warm and virtually frost free. It is grown mainly as a fodder crop, and large supplementary quantities have to be imported. Small quantities are cultivated throughout eastern France—a reflexion of the increasing incidence of summer rainfall.

Millet. Only 88,000 quintals were produced in 1938, and of this Vaucluse, a department consisting largely of the Fore-Alpine limestone plateaux, grew almost one-half (41,000 quintals).

Root Crops

Potatoes. Nearly 3 million hectares of ground are under roots and kindred crops, and almost half of that total (i.e. 44%) is occupied by potatoes. They are grown very widely for local consumption, and as the total crop exceeds the requirements for human consumption much of it is fed to pigs or used in the manufacture of alcohol and starch. Two districts specialize in the crop, namely, Brittany, which produces new potatoes, and the area around Strasbourg. Up to 1932, France exported a large amount of early potatoes, especially to Great Britain, but the extension of the Colorado beetle into Brittany has considerably reduced this trade.

Beet. Both fodder beet and sugar beet are grown to a considerable extent in France, roughly in the proportion of four to one respectively. Fodder beet is grown widely in the northern plains, chiefly for the fattening of stall-fed animals. Sugar beet is localized in the extreme north and around Paris (Fig. 43). The beet is grown on large farms in conjunction with wheat, both crops benefiting by the rotation.

Although many sugar refineries were destroyed during the war of 1914–18, the general rise in the standard of living since then has almost doubled the consumption per capita of sugar; the number of refineries is still below the 1914 total, but their output is much greater. The total number of refineries in France is 111, and of these seventy are situated in northern departments. The changes in this area are summarized below:

Refineries in Operation

	1912–13	1920–23	1928	1938
Nord	40	13	13	13
Pas de Calais	24	8	12	12
Somme	33	7	9	14
Oise	20	16	18	18
Aisne	51	11	13	13
Total for five northern departments	168	55	65	70

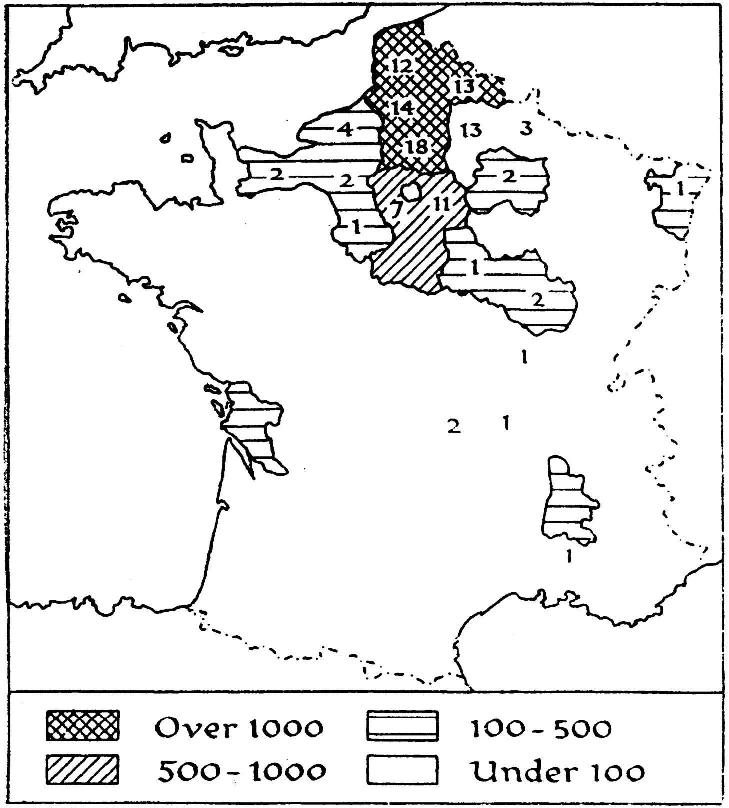


Fig. 43. Production of sugar beet in quintals per 100 ha. of each department, 1938. Numerals indicate the number of refineries in each department

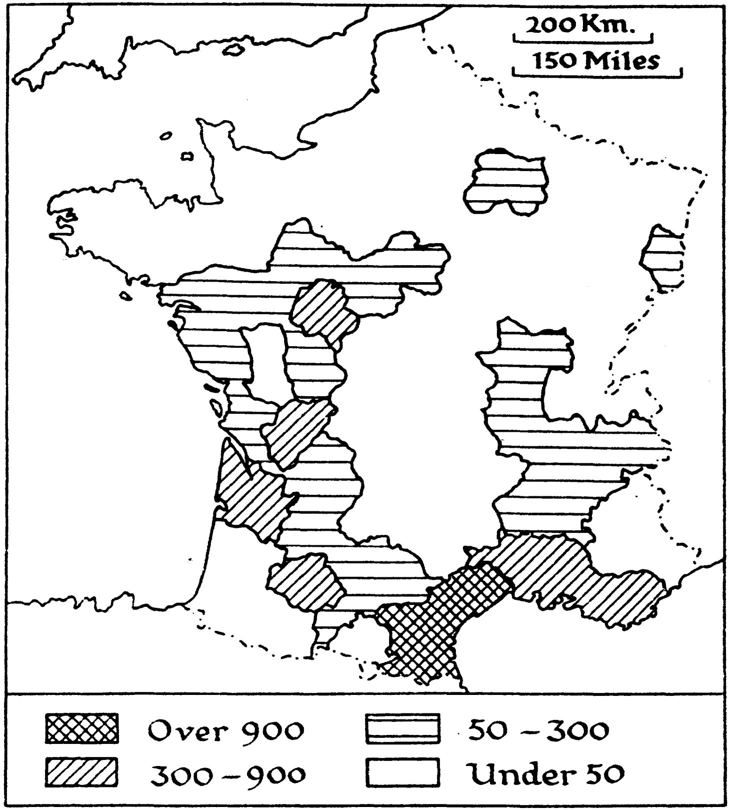


Fig. 44. Production of wine in hectolitres per 100 ha. of each department, 1938

At the same time as home production increased, sugar imports from the colonies increased almost fourfold compared with pre-1914 totals. As sugar stocks accumulated and the price of beet fell, an agreement was negotiated in 1931 between growers and refineries whereby the price of beet was fixed relatively to the price of sugar, and the refineries accepted voluntary quotas. At the same time the French colonies undertook to limit their shipments to 13 % of the home-produced total. Thus the industry achieved a certain equilibrium without state control, and the area under cultivation has fluctuated but little.

In addition to the utilization of the beet crop for sugar-refining, large quantities are sent to distilleries for the manufacture of alcohol.

Minor Crops (Fig. 45)

Flax is grown in the north-eastern departments in the Scarpe and Lys valleys, where a multitude of watercourses makes flax-retting easy. It does not, however, occupy more than 1½ % of the total arable land of the two most important producing departments of Seine-Inférieure and Nord. After a revival which reached a maximum in 1929 (79 % higher than in 1913), economic depression hit the industry, and in 1931 21,000 ha., almost two-thirds, went out of cultivation. The crop has been revived in recent years by a substantial state subsidy and has shown a striking increase since the lowest yield in 1932. In 1938, it was again above the 1913 total.

Tobacco is grown under state regulations and with a subsidy to a small but increasing extent in the south-west (Plate 20), in the two Rhine departments, and to a much less extent in the north-eastern departments and in those of Savoie, Isère and Drôme. In Alsace it forms one of the two main crops of the reclaimed Rhine flood-plain—hops being the other.

Hemp is grown to a very small extent by state subsidy in the Loire valley, but in no department does it exceed more than 0·5 % of the arable land

Wine and other Beverages

Production. France is the most important wine-producing country in the world, although Italy has a greater area under vineyards. But the French yield per hectare (40 l.) is almost twice that of Italy (22·1 l. per ha.), and in the production of fine wines France stands alone.

The vine, while not unduly exacting, as it is able to withstand periods of frost, requires a moderate rainfall in spring and early summer with strong continuous sunshine during the late summer and autumn. It grows very widely (Figs. 44, 46) on most types of soil, preferring well-drained stony or gravel soils. The effective northern limit of

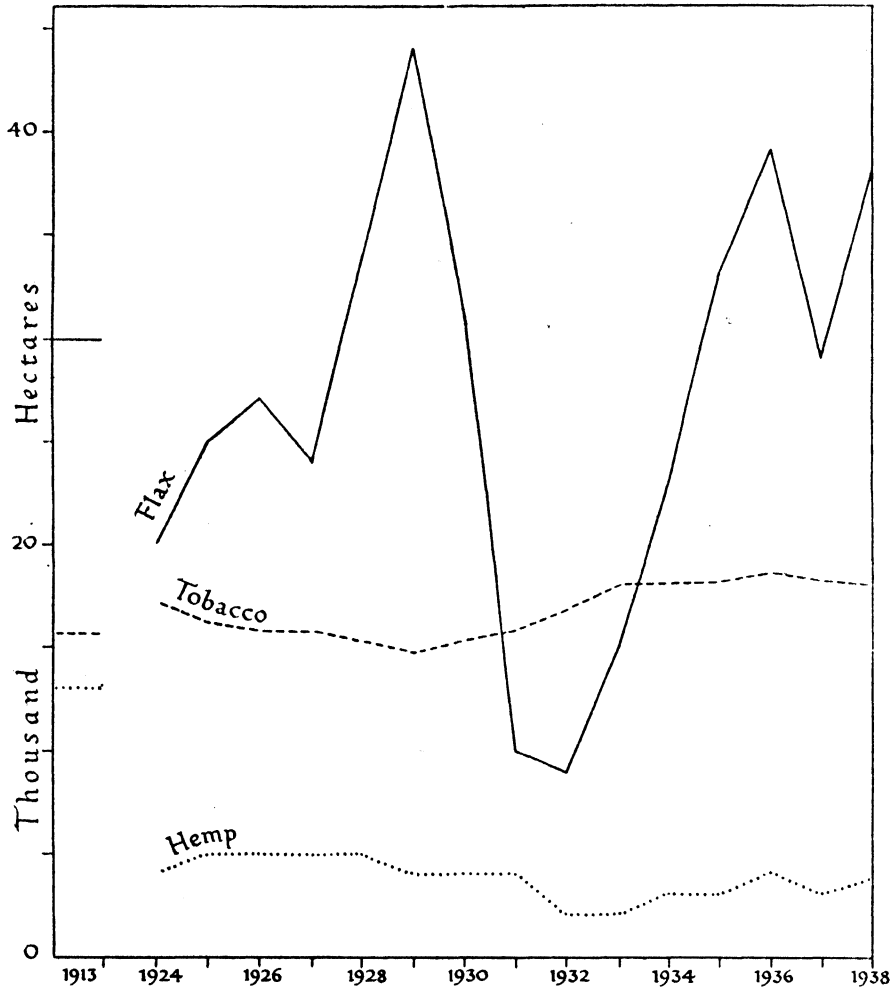


Fig. 45. Production of flax, hemp and tobacco, 1924–38

the vine is shown on Fig. 46. The bleak uplands of the Central Massif are obviously not suitable, while the southern Landes and western Pyrenees are subject to warm moist air which encourages mildew. It is interesting to note that the marginal areas of the north, where exceptional and intensive care is necessary, produce some of the best vintages.

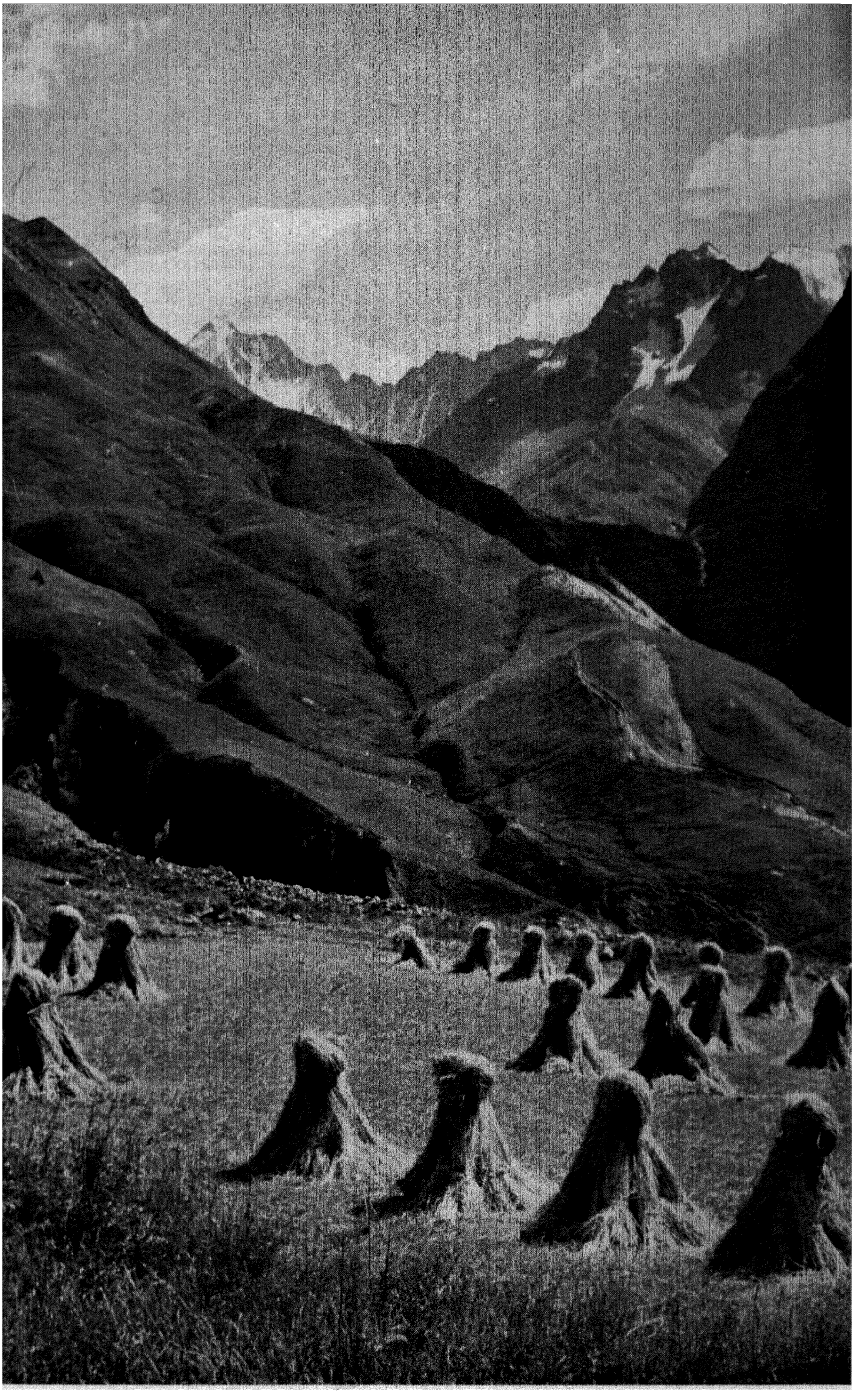


Plate 19. Grain harvest in upper Dauphiné

Almost every patch of level land in the mountains, snow-covered in winter, is utilized in summer to produce crops of hay, grain or potatoes.

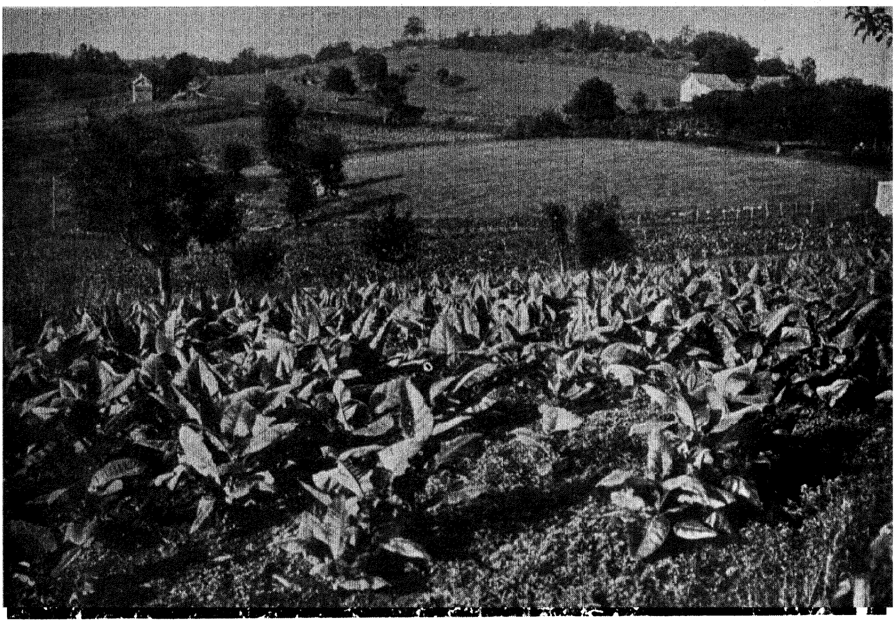


Plate 20. Tobacco cultivation near Beynac (Dordogne)

The rolling limestone country of eastern Aquitaine yields good soils on well-drained slopes. Most of the small farms have a field of tobacco (a carefully cultivated and remunerative crop) and a number of fruit trees.

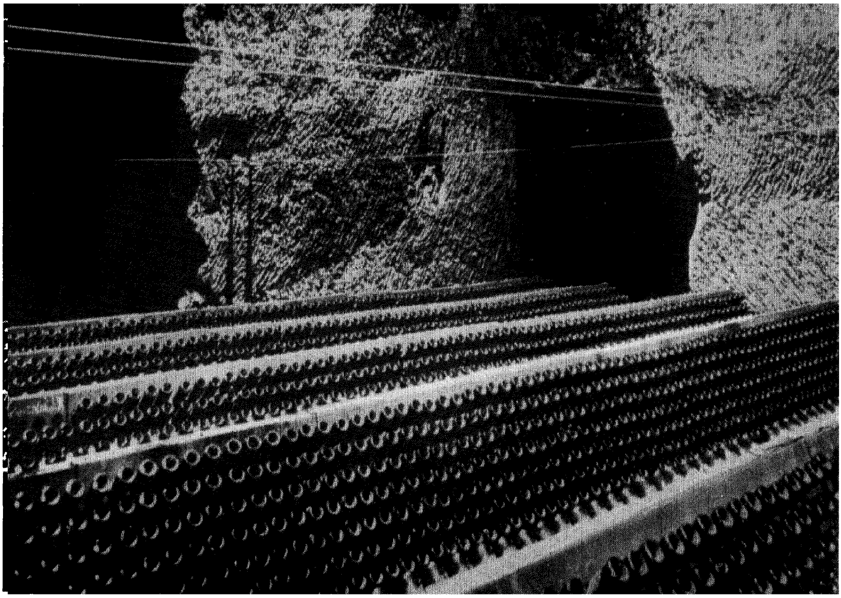


Plate 21. A Champagne cave at Reims

Storage at even temperature in caves hollowed out of the chalk assists the maturing of the

Vine growing is mainly in the hands of small-scale cultivators, as a vineyard in full bearing fetches a high price per hectare. In 1924, 82% of the 1½ million growers who declared their output had holdings smaller than 2 ha. The remaining large holdings are found chiefly in the Garonne-Dordogne area, where famous Château vintages are

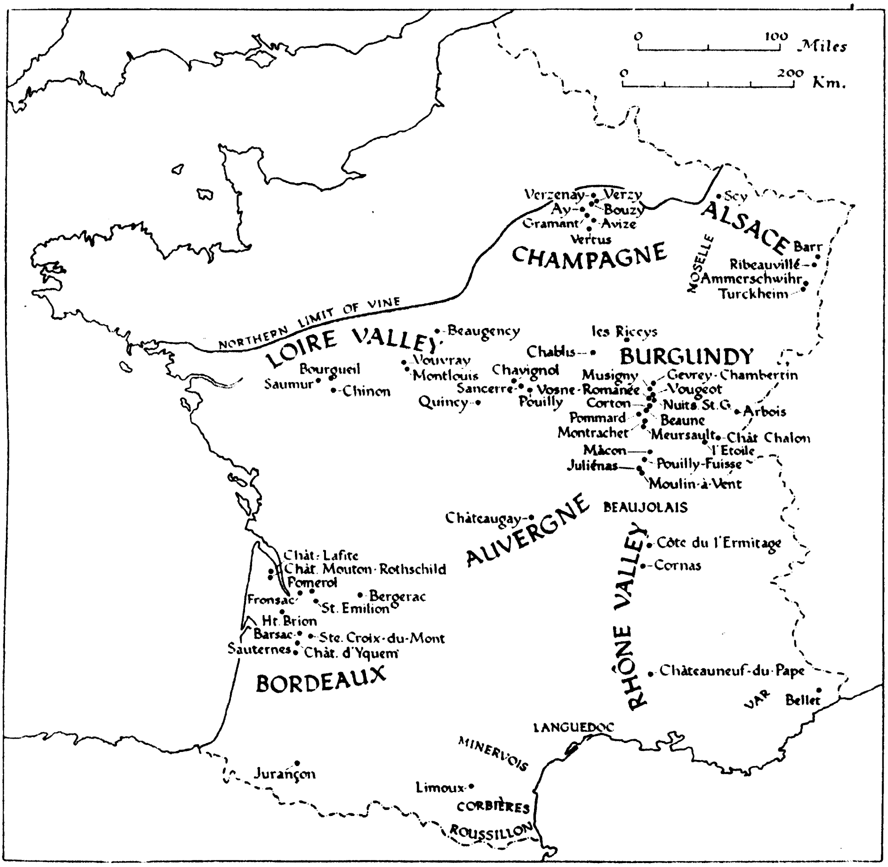


Fig. 46. Main wine-producing centres
Based on *Guide Michelin*, p. 28 (Clermont-Ferrand, 1939).

produced, a few in the Loire valley, and a very small number in the Champagne district. Many of the vintage wines such as those of Burgundy are grown by small cultivators and blended by large merchant firms.

Normally over half of the French output comes from the Midi. The grape grown is largely the *petits vins* cultivated on an extensive scale, and it provides the cheap *vin ordinaire* so widely consumed within the country. The centres of the Midi wine industry are at Béziers Nîmes, Perpignan and Montpellier (Plate 21).

The second great wine-producing area is in the south-west, and follows closely the valleys of the rivers Garonne, Dordogne and Charente, with Bordeaux as headquarters. About a quarter of the French total comes from here. Four distinct localities produce the high-grade vintage wines. The Médoc region yields fine clarets; south of Bordeaux is the Graves area; on the hills north of the Dordogne lies St Emilion; finally, the much smaller Sauternes district lies on both sides of the Ciron, a tributary of the Garonne. In south-western France are the brandy-distilling areas of Cognac, including the greater part of the departments of Charente and Charente-Inférieure, and the less important Armagnac district in the department of Gers, south of the Garonne.

Another group of wines are the Burgundies, which come from lower Burgundy (the Chablis district), the Mâconnais and the Beaujolais; the most important area is the Côte d'Or, between Dijon and Chagny. Here the soil and climate are exceptionally favourable, and owing to scattered villages and the large number of small growers the wines differ widely. About one-twelfth of the French total is produced in this district (Plate 23).

The Champagne area lies in the department of Marne. The four main districts are (1) the slopes of the limestone hills known as the Montagne de Reims; (2) the Côte des Blancs south of the river; (3) the Marne valley itself; (4) and, finally, the lower slopes of the chalk escarpment in the extreme east of the department. The wine, which is essentially an artificial product blended from the output of all of these districts, is the result of careful culture, pressing, fermenting, maturing and blending. The production, however, is inconstant and constitutes a very small proportion of the French total, averaging only about a quarter of a million hectolitres (Plate 21), although in a 'good vintage' year the value is considerable.

Another important wine-producing district is in the Loire valley. The chief areas are in Anjou and Touraine, which yield such famous wines as Vouvray and Saumur; the coastal departments produce white wines such as Muscadet, and the rest of the valley produces large quantities of *vin ordinaire*. The production averages about 5 million hl., about one-twelfth of the French total.

Alsace-Lorraine is also a small producer of wine. The vines are grown on the lower slopes of the Vosges and in the eastern valleys, sheltered from winds and with sufficient sunshine (Plate 24). Much of the wine is of ordinary quality, but such white wines as Muscatel, Riesling and Turckheim are exported.

Finally, in the Jura a number of notable wines, such as Château-Chalon and Arbois, together with much *vin ordinaire*, are produced.

Output. The area under vines grew steadily to a maximum of 2,447,000 ha. in 1874; the production of wine for market reached a total of 83·8 million hl. in the following year, a figure which has never again been reached (Fig. 47). Only about 3 % of this total was exported, but in value it was a much greater proportion of the whole. By 1879, production had sunk to 25·8 million hl.; this startling decline was due to the ravages of the *Phylloxera*, an insect native to the United States which had been introduced into Europe between 1858 and 1863 with American vine stocks. The insect multiplied at an enormous rate and attacked the roots of the highly susceptible European stocks, thus tapping the flow of sap and destroying the vine. Over a million hectares of vineyards were destroyed in France, and the financial loss is estimated to have been much greater than the indemnity paid to Germany after the Franco-Prussian War. The pest was overcome by (1) the large-scale introduction of a relatively immune American stock upon which the French vine was grafted, (2) the injection of carbon bisulphide into the ground, and (3) winter flooding where practicable. But the quality of subsequent vintages suffered, and in many localities vine growing was permanently abandoned. By 1911, an area of some 1½ million ha. was under the vine, producing about 45 million hl., and this area has remained relatively stable.

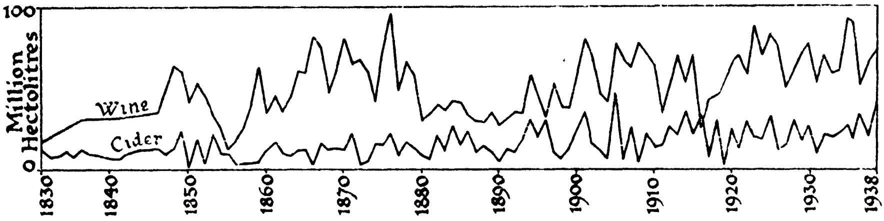


Fig. 47. Production of wine and cider, 1830–1938

But although the *Phylloxera* was conquered, the wine industry never went back to its previous prosperity. During the years of low production, Spanish, Italian and North African wines made considerable headway. Algeria, being within the French customs territory, rapidly increased its output and sale in France. In addition, the cultivation of the vine in other parts of the world, notably in

South Africa, Australia and South America, caused further decline in French wine exports. South American wines hit especially the export of *vin ordinaire* from Bordeaux to the Latin republics.

The diversion of labour from agriculture during 1914–18 left the vineyards open to disease, and in 1915 two-thirds of the crop was lost owing to mildew. Since that time the industry has recovered somewhat, but it has been hit by the heavy and increasing English excise duties, by Prohibition in the U.S. between 1920 and 1933, after that by the relatively small import quota allowed by the U.S., and by the general world economic crisis, wherein wine as a luxury product suffered severely.

As wine is the principal drink of the country, it is likely that the total amount produced is very many times that exported. But the home consumption has fallen greatly, owing to the general economic crisis, to unduly high prices, and to the greater adoption of other beverages such as beer and cider. Between 1931 and 1933, many of the great proprietors became bankrupt and their estates were broken up for sale. Since 1933, however, there has been some degree of recovery.

Beer and *cider* are the principal beverages in the areas where the vine cannot be successfully grown, although the first is increasing as a drink generally. *Beer* is produced chiefly in the north and east, cider in the north-west. Hops are grown in Alsace and Burgundy, but from the latter area they are sent to the breweries in the Nord and Rhine departments. Both the area under cultivation and the total yield fluctuate considerably. *Cider* is the normal beverage of Brittany and Normandy, and is produced in the apple-growing departments that border the English Channel. The chief feature about the yield is its variability (Fig. 47). Thus the yield in 1938 (34·6 million hl.) was more than twice that of 1937.

MARKET GARDENING

In many parts of France climate and soil, together with intensive skilled labour, have resulted in the localization of special crops. Adjacent markets in large towns have encouraged the large-scale production of 'perishable' commodities which command a good price. With the organized development of fast main-line trains with refrigerator cars (notably by the P.L.M.) and of motor transport, district surpluses have been sent farther afield. Thus Vaucluse and Var are able to send fresh produce to Paris, while a large amount of table fruit,

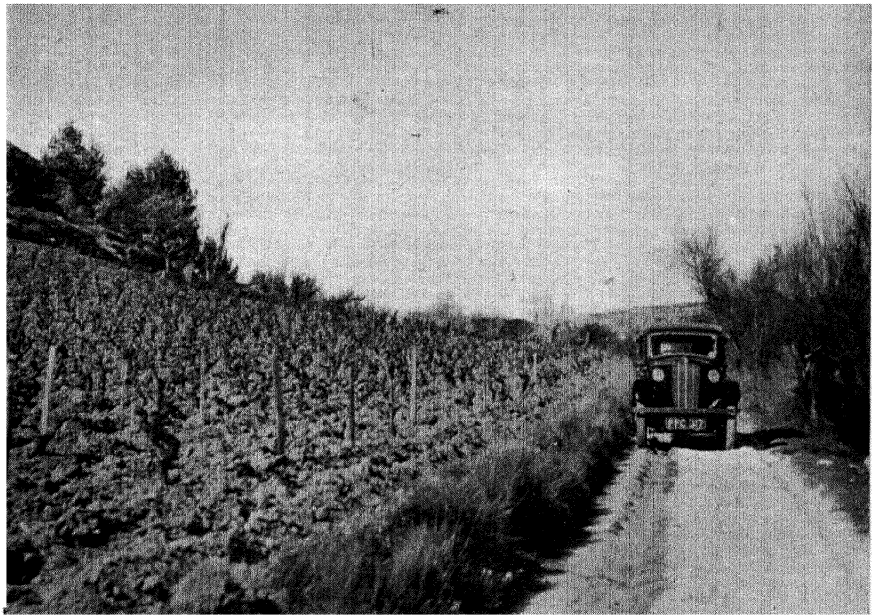


Plate 22. A vineyard near Narbonne (Aude)

Extensive vineyards in the Midi yield vast quantities of *petits vins*, grown and processed for the production of cheap *vin ordinaire*.

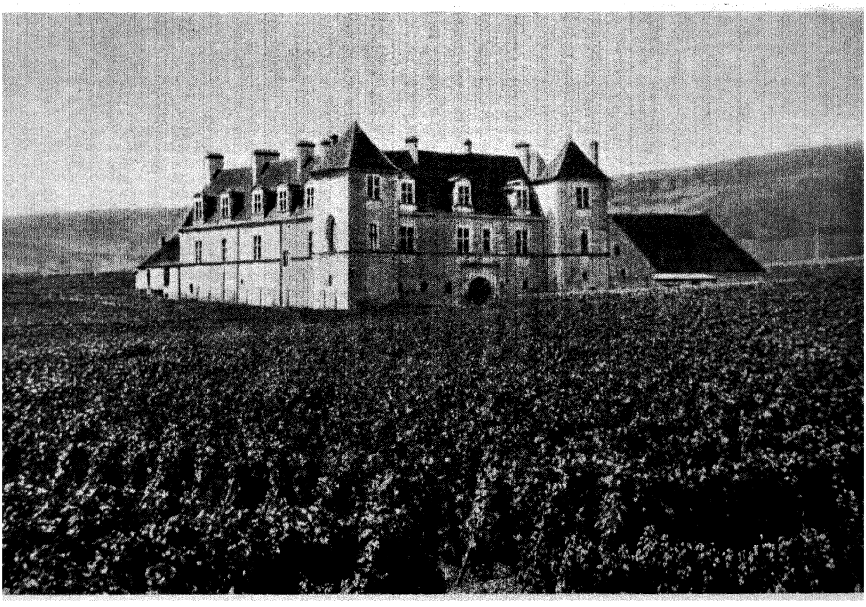


Plate 23. A Burgundy vineyard

The typical unit of production in the wine industry of Burgundy is the *clos*, of relatively small extent, from which the vintage derives its name—in this case Clos-Vougeot. Behind the château is the escarpment of the Côte d'Or.

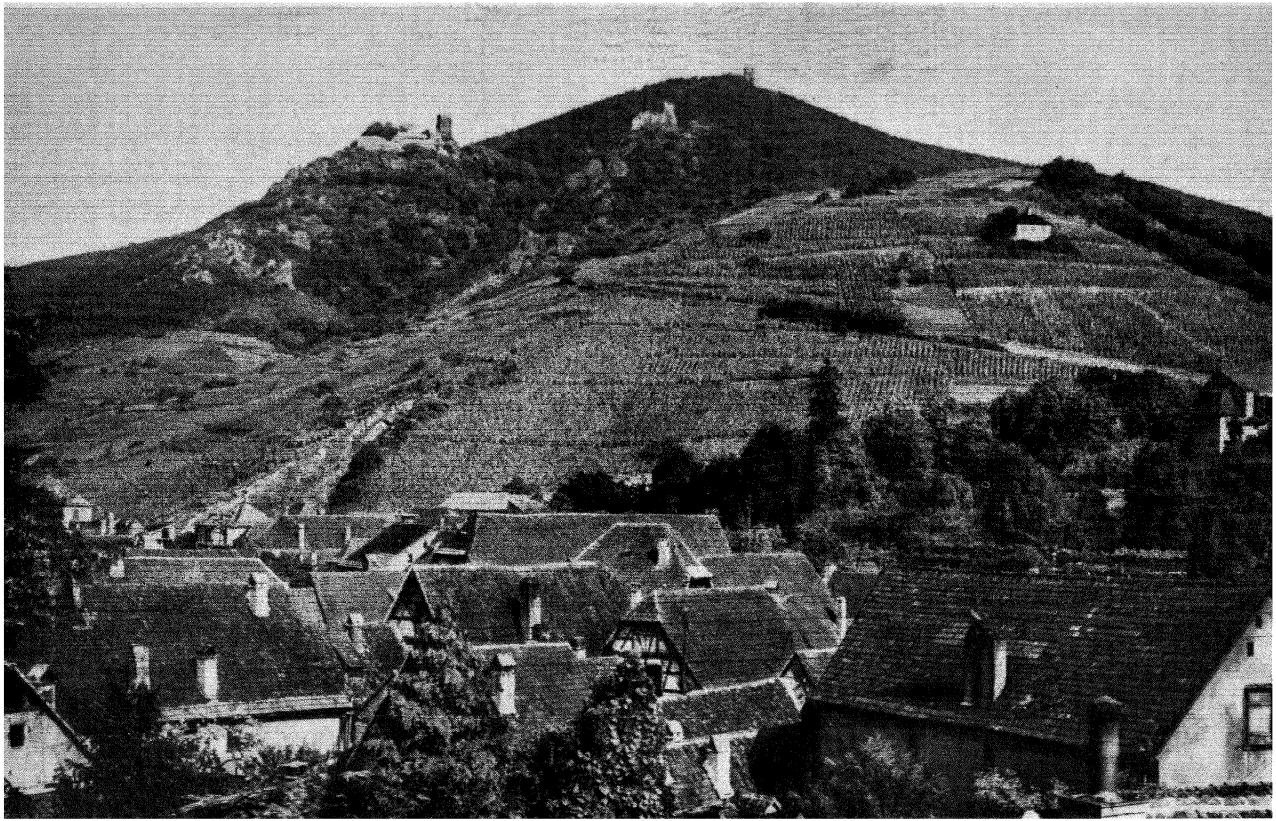


Plate 24. Vineyards at Ribeauvillé (Alsace)
Alsatian vines are grown on the lower south-facing slopes of the Vosges.

cut flowers and other luxury produce from Provence appears in the London markets. As a result, in 1938, 143,042 people were engaged exclusively in the cultivation of fruit and 39,084 people in the cultivation of flowers. Of the total area devoted to horticulture in 1938 (that is, about 437,000 ha.) 304,000 ha. were cultivated for subsistence and the remainder for the production of cash crops for market—vegetables, fruit, flowers and shrubs (Plate 25).

Vegetables. In mild damp regions, such as the sheltered bays of Brittany and the Marais Poitevin, early products (*primeurs*), notably cauliflowers, new potatoes, onions and tomatoes, are cultivated for markets in Paris, England and the industrial north-east of France. The lower Rhône valley offers similar possibilities over a longer period of the year, and in Provence and Roussillon all types of early vegetables for salads are grown. In many districts, vineyards have been uprooted to make room for the more lucrative production of *primeurs*. Here irrigation, protection from the mistral by cypress and wattle fences, and smoke screens against frost are necessary (Plate 26). Around the large towns, market gardening and glass cultivation produce vegetables for the urban markets. In certain districts, notably round Bordeaux and Metz, peas, beans, asparagus, etc. are grown for canning and bottling.

Fruit. In a climate which has much sunshine fruit growing will clearly be important. The commercial production of fruit is carried on in many areas, and once again localized specialization is the case. Notable features are fruits for canning and crystallizing in Gascony, high-class dessert fruit of all kinds in the Rhône valley, cherries for bottling and sugaring in the upper Rhône area, black currants for making *cassis* round Dijon, almonds, figs and citrus fruits on the Mediterranean coast, walnuts in Isère, chestnuts on the Central Massif and the olive on the south-facing terraces of the Midi. The last is near the northern climatic limit and frosts may be destructive, but some oil is produced for margarine and soap as well as for export in a refined state. As in most Mediterranean lands, much olive oil is used locally for a wide variety of domestic purposes in place of animal fats.

Flowers are cultivated on the Côte d'Azur for making perfume and for the 'cut-flower' export trade; the centre is Grasse (Plate 27). Another example of large-scale specialization is the production of roses in Brie and Provins.

Silk. The cultivation of the mulberry may be linked with market gardening. It is cultivated on the lower slopes of the middle Rhône valley and of the Mediterranean coast, but the production of home raw silk has decreased greatly. The cottage industry of silkworm rearing was halved between 1913 and 1936, largely due to competition by imported raw silk from Piedmont, Syria and the Far East. Production of silk is carried on in seventeen departments, the most important being Gard, Drôme, Ardèche, Var and Lozère (see pp. 239–40).

LIVESTOCK

There are three types of natural pasture in France, namely, the upland type, the lowland *bocage* type, and the smaller areas of coastal saltmarsh.

The summer upland pasture is very varied. It includes the *alpages* or *alps* between the permanent snow-line and the tree-line (Plate 28). Animals are taken there from the valleys in early summer to graze until autumn. Other varieties of upland pasture include on the one hand the scanty herbage of the limestone Causses and the heath pastures of crystalline uplands, and on the other the better pasture of the well-watered lower plateaux such as Limousin, and of the rich volcanic soils of parts of the Central Massif.

The lowland *bocage* type is found where the rainfall is evenly distributed throughout the year and where conditions are mild, as for example in Normandy, Brittany and Vendée. The rank grass is suitable for cattle grazing. In general, too, hay meadows are conspicuous features in the broad clay vales that separate the higher limestone plains in northern France.

The third type is saltmarsh pasture found notably in the Crau and Camargue districts of the Rhône delta, and along the Vendée and Breton coasts.

The distribution of permanent pasture is shown on Fig. 38. The rearing of stock is, of course, not confined to these natural pastures, but is carried on in many places in conjunction with arable farming (Plate 16).

The number of cattle has risen slowly from 1875 to 1938, with but little break during 1914–18, and has stabilized at about 15½ millions. Sheep, however, decreased sharply during that period to just under 10 millions and are still significantly below 1913 figures; and pigs also declined, although they recovered their pre-1914 numbers in the next twenty years. The large war-time losses of horses had been almost made good by 1929.

Cattle are reared in most parts of France (Fig. 48), the least important area being along the Mediterranean coast, although even

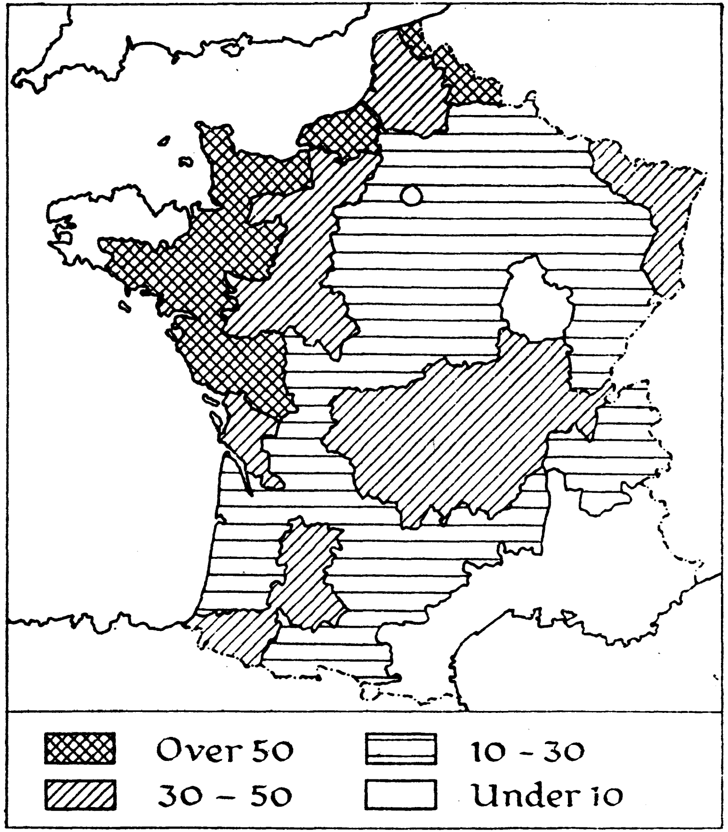


Fig. 48. Distribution of cattle per 100 ha. of each department, 1938

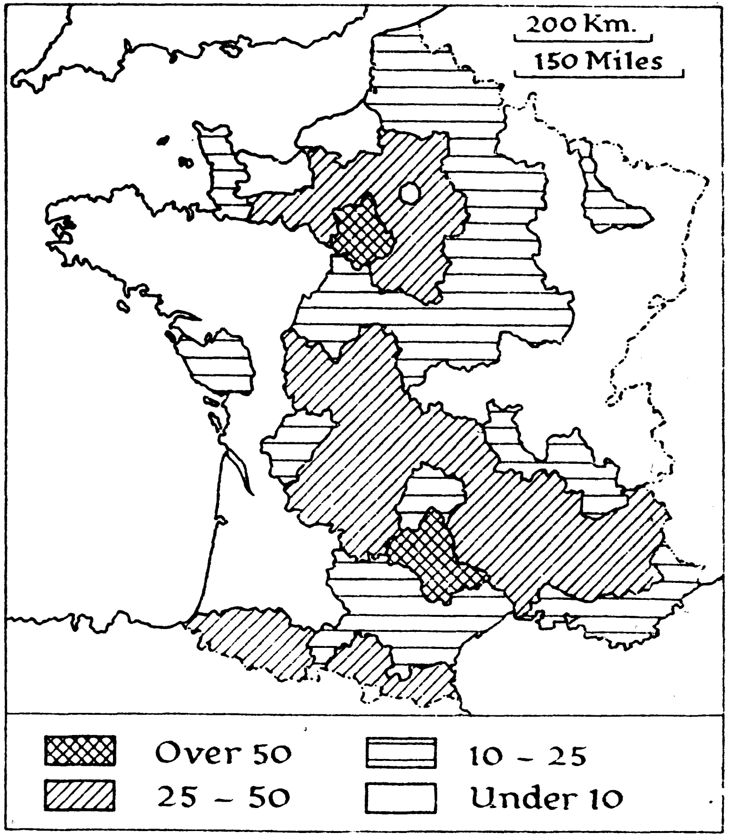


Fig. 49. Distribution of sheep per 100 ha. of each department, 1938

there the Camargue is rather an exception. One important cattle area is the Armorican peninsula, despite the high proportion of ploughland and the low proportion of natural pasture. The Cotentin department of Manche has a greater density of cattle than any other in France; its cattle average 91 per sq. km. compared with the general French average of 29; the corresponding figures for milch cows are 51 and 17 respectively.

On the Central Massif, cattle are reared in the departments of Cantal and Haute-Loire, and in the more northerly departments of Allier and Saône-et-Loire (the natural pastures of Charolais (Plate 32)). An outstanding breed is the Salers. The animals are grazed in summer on the pasture of the volcanic soils of the plateau and are hay fed in the valleys in winter. Other important districts are in Picardy and Artois, in the Vosges, in Savoy, where the Tarentaise breed are kept, and in the Pyrenean foot-hills. Transhumance, that is the seasonal movement of animals to the high pastures in summer, is practised in nearly all upland areas.

Dairying is most important in Normandy, the Charente, Jura and Savoy. On the whole, production is backward and milk yield low, due to the multiplicity of breeds which hinder the organization of breeding societies, to the lack of a farming aristocracy interested in scientific breeding, to insufficient supplementary feeding of roots and oil-cake, to the prevalence of disease such as tuberculosis, to bad housing, and to lack of co-operation. Only in the Charente, and to a less extent in Normandy, Savoy and Jura, is there much co-operative organization. Although far below Danish or Dutch standards, Charente butter fetches the highest price on the Paris market.

Co-operation in the Charente

	No. of societies	No. of members	No. of cows	Milk handled, million litres	Butter produced, tons
1888	1	90	330	0·6	31
1908	112	67,026	165,021	246	11,636
1928	134	87,694	263,303	446	19,647
1938	134	77,820	271,539	447	19,775

From P. L. Yates, *Food Production in Western Europe*, p. 267 (London, 1940).

Other parts of France have a number of small-scale co-operative dairies but primitive independence is more usual. By far the greater part of butter and cheese is made on the farms or in the dairy châlets in the mountains. Such varieties as Gruyère in Savoy and Jura,

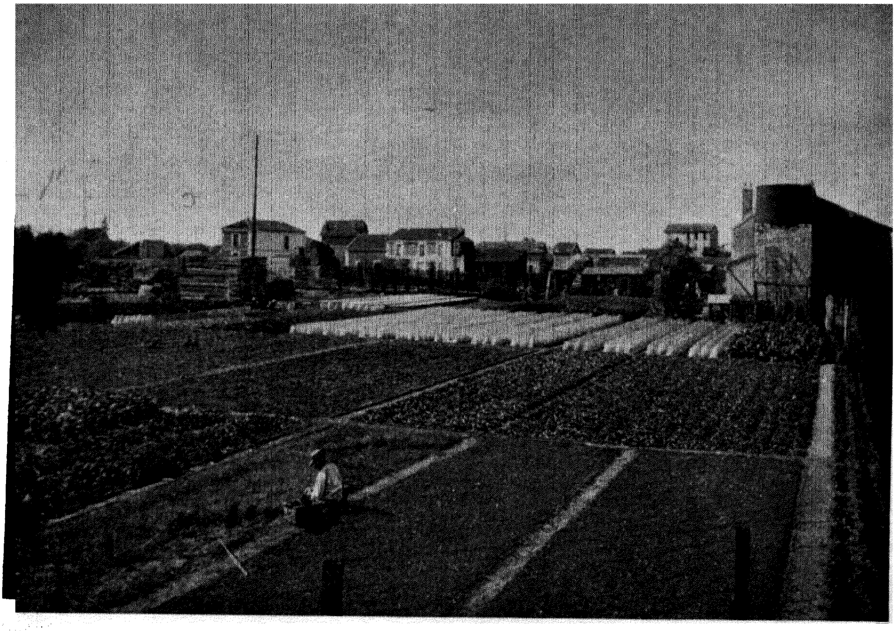


Plate 25. Market gardening at Châtillon (near Paris)
In the Paris suburbs, as around many great cities, vegetables are intensively cultivated.

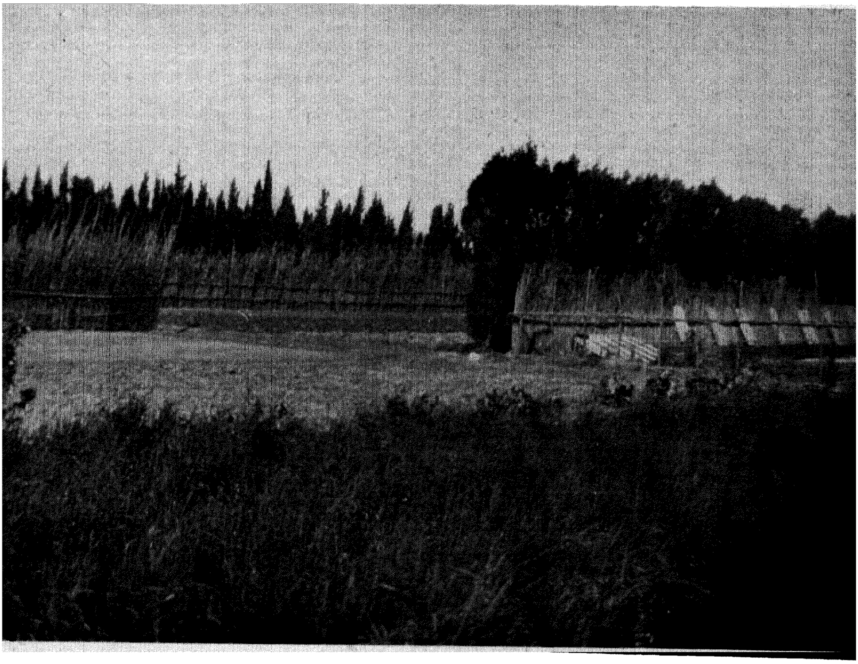


Plate 26. Cultivation of *primeurs* at Château-Reynard (near Avignon)
Early vegetables are protected against the mistral by tall hedges of osiers.

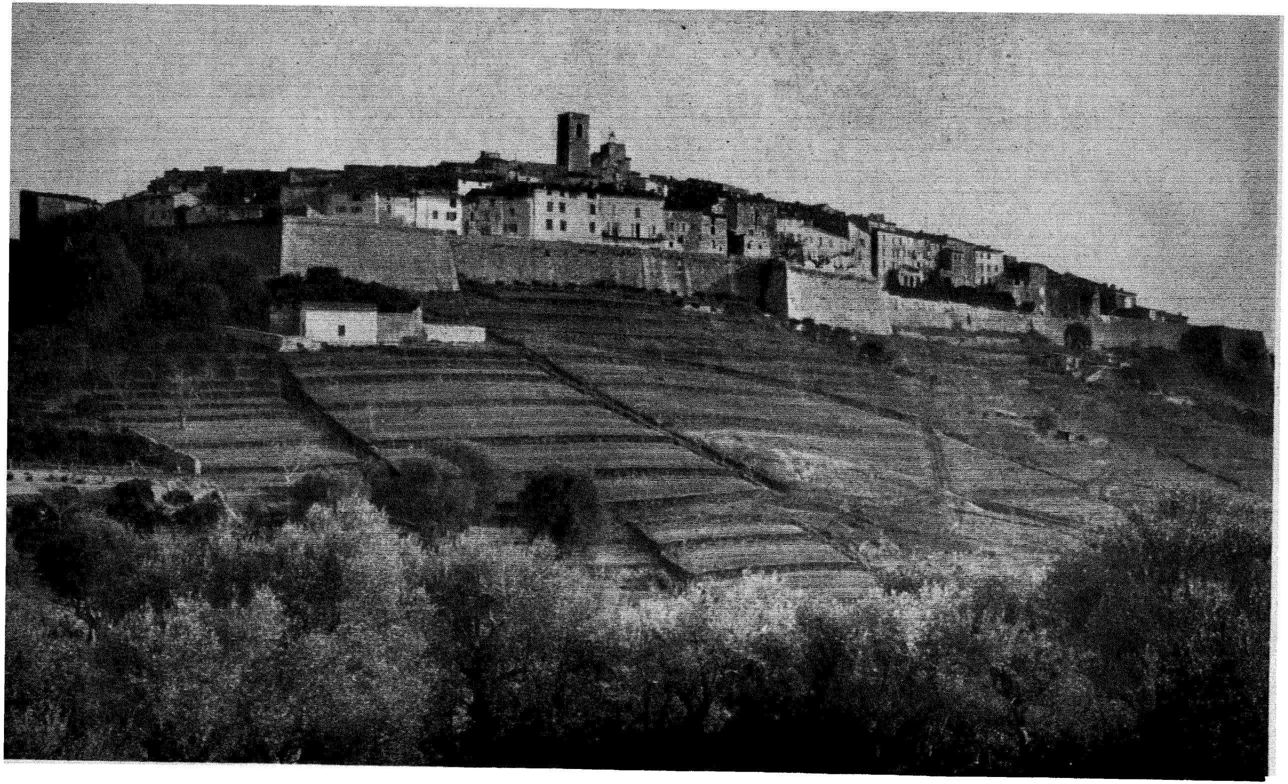


Plate 27. Flower cultivation near Grasse (Alpes-Maritimes)

The south-facing slopes below the ramparts of the hill-top village of St Paul are divided by wattle fences into sheltered plots, where flowers and aromatic shrubs are grown for the perfume industry.

Fourme and Laguiole in the Central Massif, and Gérômé-Munster in Lorraine are almost entirely farm-made. In the north there is an increasing output of factory cheese, although much is still farm-produced by individuals; named varieties include Brie, Camembert, Pont l'Evêque, Livarot and Maroilles (Fig. 50). The increase in production which rapidly overtook consumption after 1918 inevitably led to a decrease in prices, accentuated very markedly by the rapid increase in imports. As a result, quota regulations were imposed to restrict imports of butter, cheese and margarine, and a subsidy in 1935 helped to finance the butter export trade. The milk industry is almost wholly unorganized owing to small-scale production, and only in Paris is there any large marketing organization.

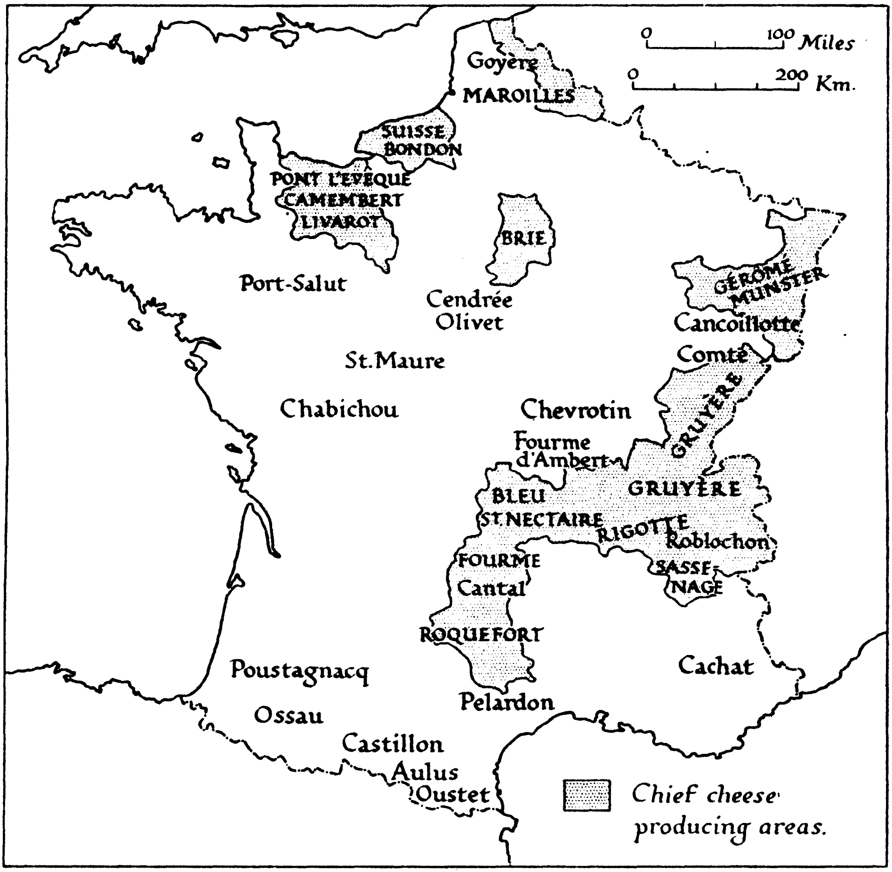


Fig. 50. Main cheese-producing districts
Based on the *Atlas de France*, Plate 40 (Paris, 1934).

Meat. The production of meat is secondary to milk but is not unimportant. The increase in numbers of animals in post-war years has resulted in a supply sufficient to meet the home demand; some animals were even exported to Italy.

A large proportion of the meat is veal, which is very widely produced because many cows are calved for the sake of their milk; the calves are slaughtered young to save the cost of feeding. There is a certain amount of specialized bullock fattening, especially in the north, where store cattle brought from the Cotentin, the Charolais and Limousin are fattened indoors on sugar-beet pulp and oil-cake. The chief market for fat stock is at La Villette in Paris. Provincial slaughterhouses on a larger scale have been tried, but have failed owing to the small-scale production and the seasonal fattening system which results in long periods of inactivity. The rearing and training of bullocks for draught purposes (Plates 34, 35) and for the plough goes on in most places, but it is a special occupation in the farms of the Central Massif.

Sheep are reared mainly in the departments around and to the north of Paris, in the Central Massif where Aveyron and Lozère are the chief departments, in the Rhône delta and along the Pyrenean foot-hills (Fig. 49). They are also reared on the rougher pastures of the Cotentin, on the saltmarshes of the coast of Brittany and Normandy, and on the drained marshes of Deux-Sèvres, Charente and Charente-Inférieure. In the Crau and Camargue districts of the Rhône delta extensive grazing is practised, and flocks are sent to the Alpine districts of Dauphiné and Savoy, often by rail, for the summer months (Plate 30). In most of these districts sheep are kept both for wool and mutton. In the Causses, milk of sheep is used for cheese making, and there are over 500 concerns making the well-known Roquefort cheese (Plate 33).

The total number of sheep in France has declined drastically, and in 1938 there were only half as many as in 1900. Among causes to which this decline is attributable are the increase in wages and consequent difficulty of finding shepherds, the disappearance of biennial fallow in the southern part of the country, and low wool prices. As a result there is a large import of sheep, chiefly from Algeria, and of wool.

Pigs. Production is almost entirely unorganized and is devoted to supplying local markets. One or two areas, including Brittany, the Limousin district, Lorraine and Artois, have a certain degree of specialization for ham production, especially where they utilize skimmed milk and whey from the dairies. Apart from those, pigs are kept on a small scale as a secondary source of food almost everywhere but especially by poorer peasants. They are fattened for slaughter in

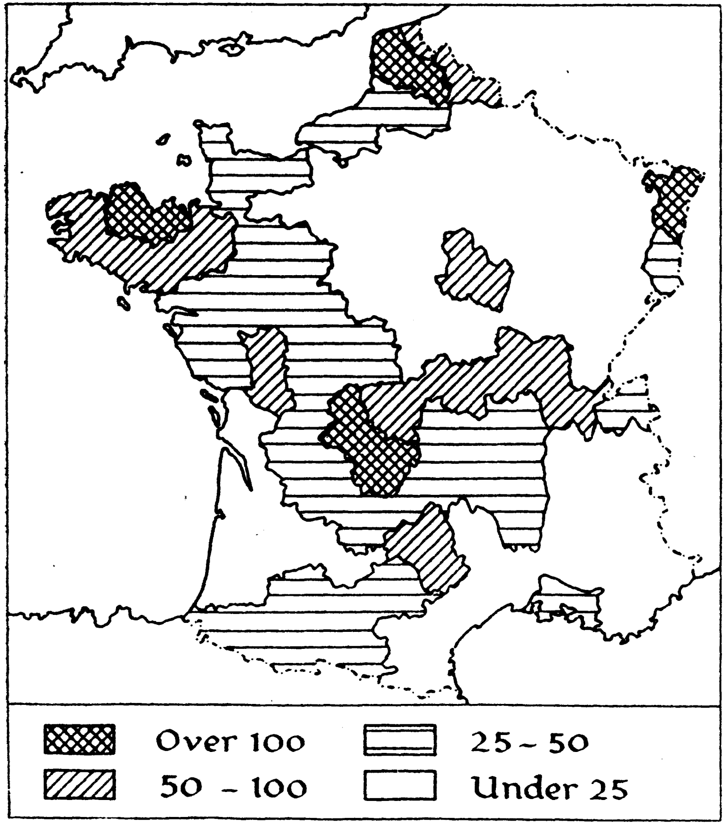


Fig. 51. Distribution of pigs per 100 ha. of each department, 1938

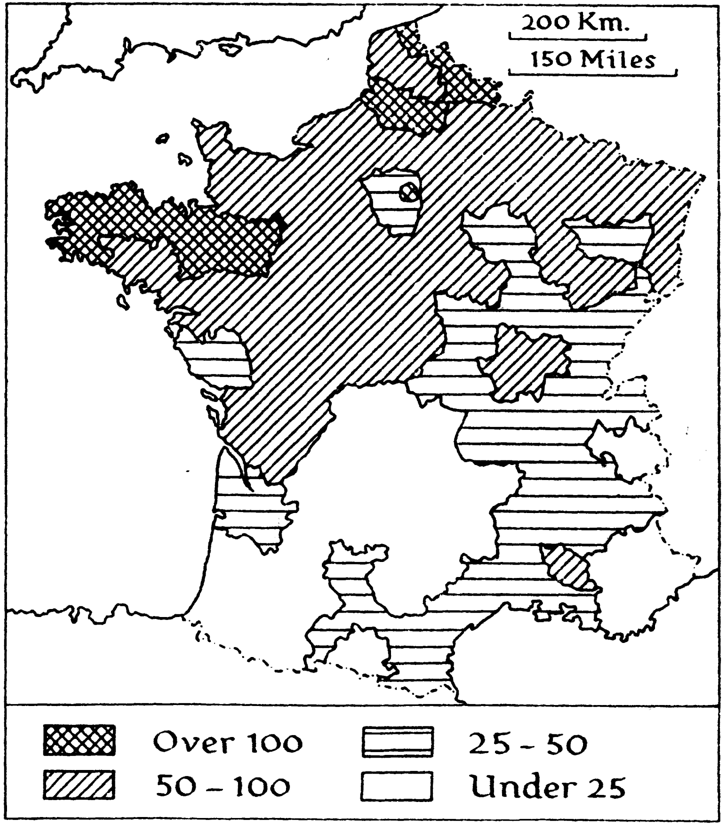


Fig. 52. Distribution of horses per 1000 ha. of each department, 1938

late autumn and constitute the winter meat supply. Although the quantity sold to the public has increased, over 40% is still consumed on farms. War-time slaughtering between 1914 and 1918 caused a rapid decrease, but since then numbers have increased steadily and the 1938 total slightly exceeded that of 1913 (Fig. 51).

Horses, etc. Despite the extensive development of mechanical traction and the virtual disappearance of horse-drawn vehicles in towns, the horse has held its own since 1918 after the heavy war-time losses. The total number in 1938 was 83·6% of that in 1913. The chief horse-rearing areas are in Brittany, where Finistère has more head (20) per square kilometre than any other department; then come Mayenne and the north-eastern departments (Fig. 52). The animals are bred largely for ploughing.

Mules and asses are used extensively as beasts of burden, there being 135,000 and 85,000 of them respectively in 1938. Mules are used in the south-east and south-west of the country; numbers of donkeys are to be found in Manche and Calvados in the north and in the northern part of the Central Massif, especially in Corrèze.

Other Livestock. Goats and *basse-cour* animals, that is poultry and rabbits, are kept largely as supplements by the small farmers, yet the total value is estimated to be about two-thirds that of the entire wheat crop. One or two goats are often kept to provide milk for those who cannot afford a cow, or maybe a few goats are pastured with the cattle. In some areas to the south of the Loire and in the Rhône valley the goats-milk is made into well-known local cheeses. A number of large farms near Paris produce eggs commercially, but the remainder of the home market is supplied by a very fluctuating yield from the general farms; only about 10% of the eggs that appear in the market are imported.

WORKING POPULATION

In 1931, nearly 7 million people were engaged in agriculture and allied pursuits (Fig. 53), representing approximately 35% of the working population (Fig. 55); of these just over 3 million were male. The total represents a decrease of over 1·6 million on the 1911 figures, as shown by the following table:

Millions of workers engaged in agriculture

	Male	Female	Total
1896	5·7	2·8	8·5
1911	5·3	3·2	8·5
1931	3·1	3·8	6·9

(Excluding Alsace and Lorraine)

From P. L. Yates, *Food Production in Western Europe*, p. 283 (London, 1940).

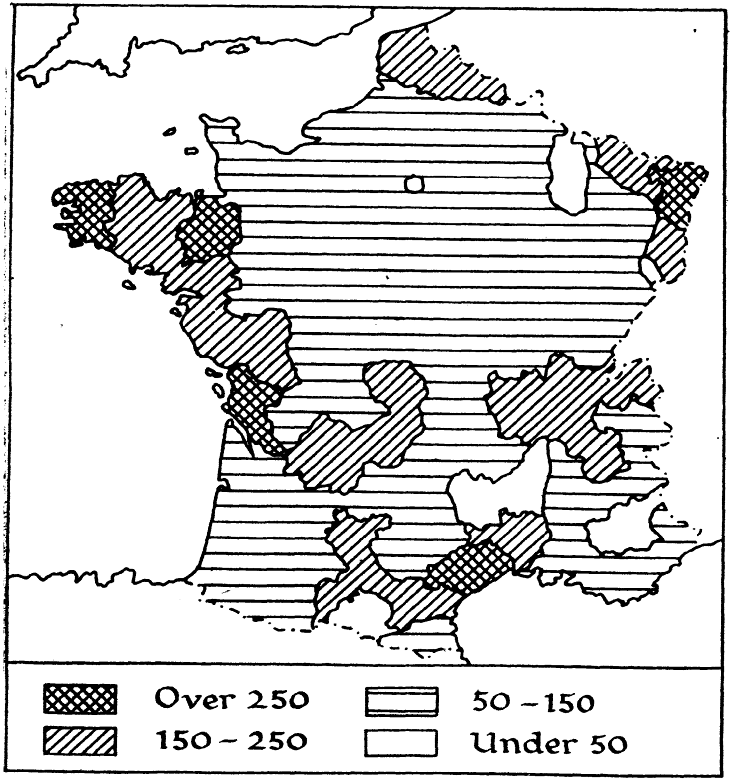


Fig. 53. Distribution of agricultural population per 100 ha. of each department, 1931

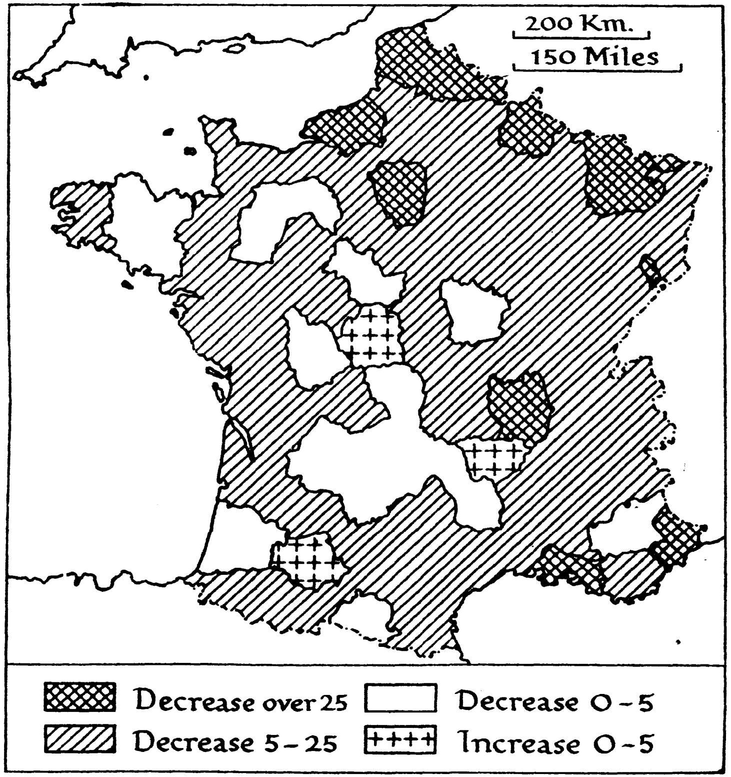


Fig. 54. Changes in rural population, 1881–1931, by departments

Statistics from which these figures and also Figs. 55, 56 were drawn were taken from vol. 1, part 3 of the *Recensement général, 1931* (Paris, 1935).

The large decrease in male agricultural workers is striking; the less marked although considerable total decline is partially compensated by the persistent increase in female labour. This decline has not been uniform over the whole of France. Between 1881 and 1931 the numbers of rural dwellers actually increased in three departments (Fig. 54), but in no case by as much as 5 %. During the same period the most marked decrease was in the departments of Seine, Seine-et-Oise and Alpes-Maritimes where the agricultural population was halved, and in the departments of Rhône, Pas-de-Calais, Meurthe-et-Moselle and Belfort where the decrease was between 40 and 50 %. In thirty-six departments the decrease was less than 10 %, notably in Brittany, the Loire valley and the Central Massif. The rural exodus is of long standing; it has been a feature of the mountainous parts since the middle of the last century, but it became more general after 1881. This was due to a variety of causes, including the abandonment to stock of poorer lands, the increase of machinery, the decay of rural industries, the drift to the more attractive work and wages of the towns, and a birth-rate even lower in rural areas than the generally declining French rate, the result maybe of efforts to reduce the effects of divided inheritance. Yet agriculture is still by far the largest occupational group, and since 1930 the number thus engaged has started to rise again as a result of industrial unemployment. In 1931, 60 % of all those employed in agriculture were their own masters either as owners, tenants or *métayers* (see p. 131), while the remaining 40 % were labourers or employees in some capacity. Of the latter, 71 % were male and 29 % were female, either workers on the land or farm servants. In 1932, an inquiry into the question of agricultural wages yielded the following results:

Average daily earnings in francs

	1924	1928	1930	1932
All labourers	14·80	20·60	22·50	22·35
Male labourers	—	18·94	20·85	20·75
Wagoners	—	21·56	23·73	23·00
Female labourers	—	14·20	15·41	15·38
Female servants	—	13·58	14·74	14·72

The trend of these wages, namely, a steady rise to 1930, then a slight fall, has followed very exactly the trend of wages of other occupational groups. The above figures are averages for the whole country but differ widely in different districts. The proximity of large cities, industrial areas or coalfields necessarily forces agricultural

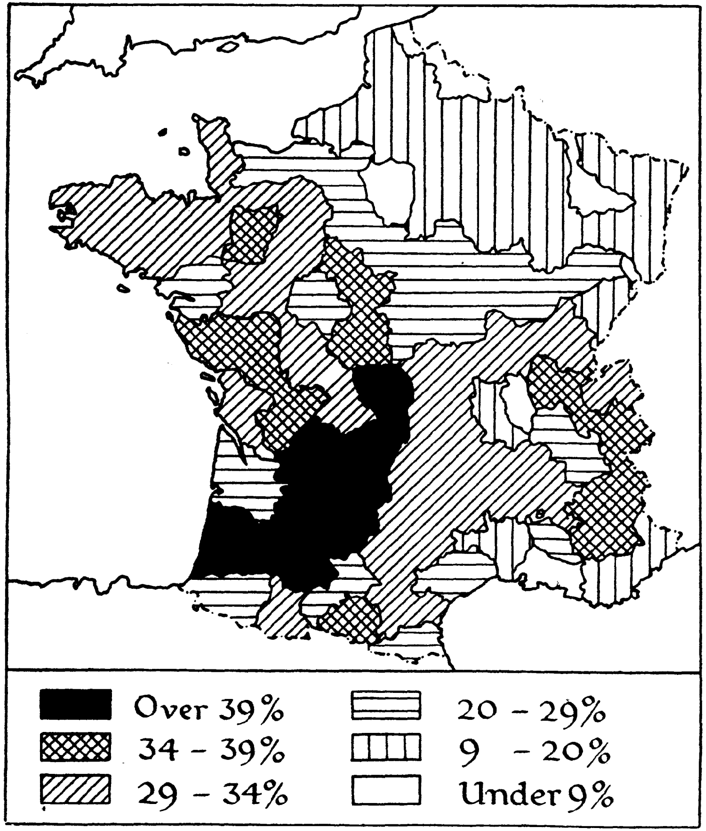


Fig. 55. Percentage of the working population engaged in agriculture in each department, 1931

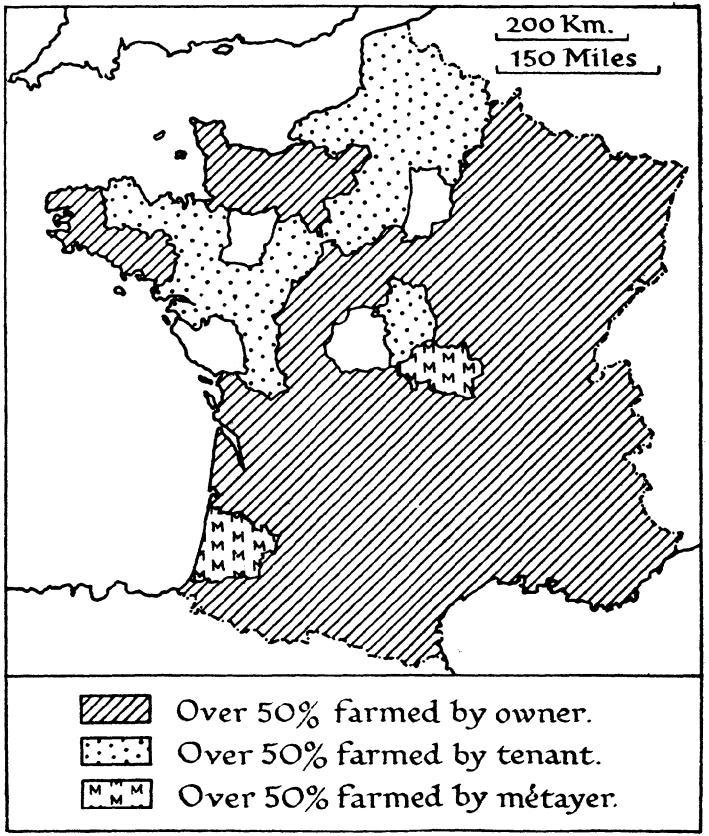

200 Km.
150 Miles
Over 50% farmed by owner.
Over 50% farmed by tenant.
Over 50% farmed by métayer.

Fig. 56. Systems of land tenure, 1932, by departments

wages up to meet the industrial competition for available labour. Thus around Paris the average wage per annum in 1937–38 was 14,050 fr., but in Ariège and Hautes-Alpes the figure was only about 4,000 fr. Average pre-1939 French agricultural wages (about 20*s.* to 25*s.* per week) compare favourably with Belgium (18*s.* to 22*s.*), but very unfavourably with Great Britain (33*s.* to 40*s.*).

Most people engaged in agriculture live permanently on the farms where they work, but there is some seasonal movement. This consists partly of a small shifting semi-urban, semi-rural population and partly of a seasonal influx of foreign labourers, but in no case is it great in amount, as the harvest on the characteristic small-holding merely involves the intensive and lengthy labour of all members of the family. The census of 1929 gave a total of over 800,000 men and women of French nationality employed temporarily in agriculture, that is, one-eighth of the total agrarian workers.

In 1929, there were a quarter of a million foreign agricultural workers in France, of whom half were permanently employed. Spaniards, Belgians and Italians from the adjoining countries formed the bulk of this labour, but Poles, chiefly because of their low standard of living and willingness to work for a very small wage, were also numerous. The Poles work mainly in the sugar-beet areas of the north-east, while the Spaniards and Italians are found along the Mediterranean littoral. Full details of the foreign elements in France are contained in Appendix I, pp. 375–92.

Land Tenure

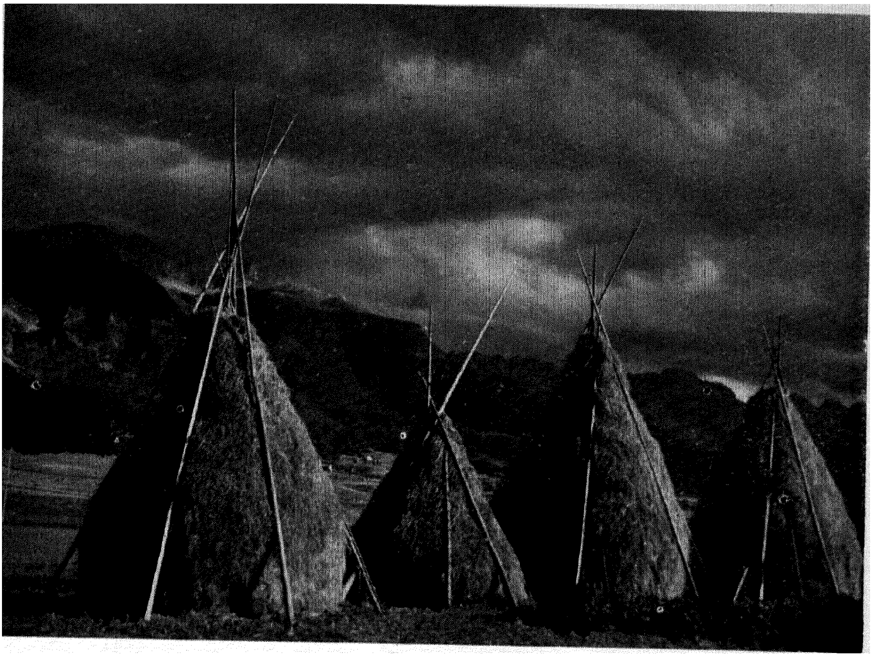
Farmland in France is cultivated by an owner-occupier, or by a tenant-farmer, or by a *métayer* or 'share-tenant' (Fig. 56). The proportions of these in 1929 were as follows:

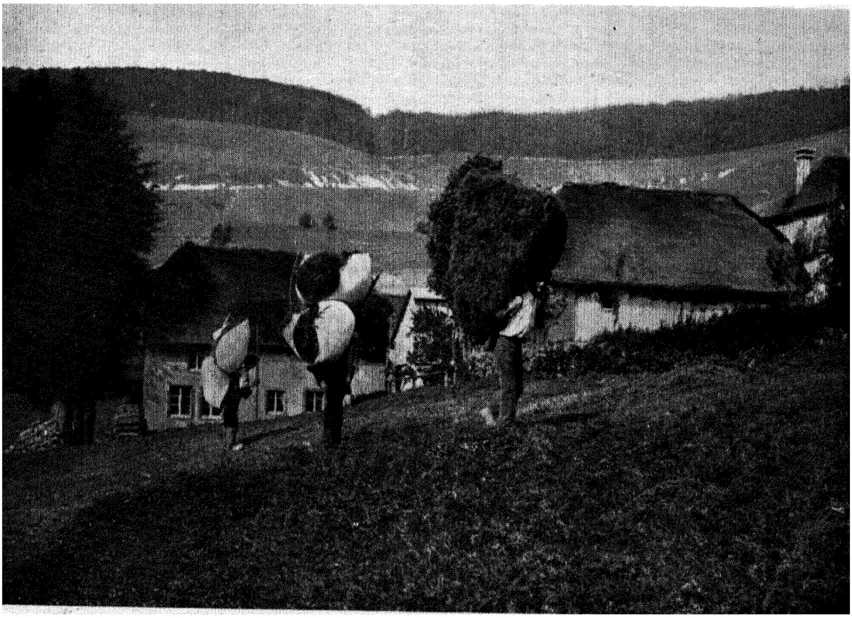
	% of holdings	% of area
Owner-occupiers	75	60
Tenants	20	30
Métayers	5	10

From P. L. Yates, *Food Production in Western Europe*, p. 277 (London, 1940).

The owner-occupiers are in the great majority in the south and east, where many departments have 90% of their cultivable land farmed by the owners.

Less than one-third of the total agricultural area of France is cultivated by tenants, although in five departments of the Seine valley more than 70% is cultivated in this way. In this area farmers and landlords





Plates 28, 29. The hay harvest

In mountain areas the hay crop is a vital part of the farming economy. Plate 28 (above) shows the method of stacking in the Alpine district, where high winds and heavy rain are frequent; Plate 29 shows a mountain farm in the High Vosges of Alsace.

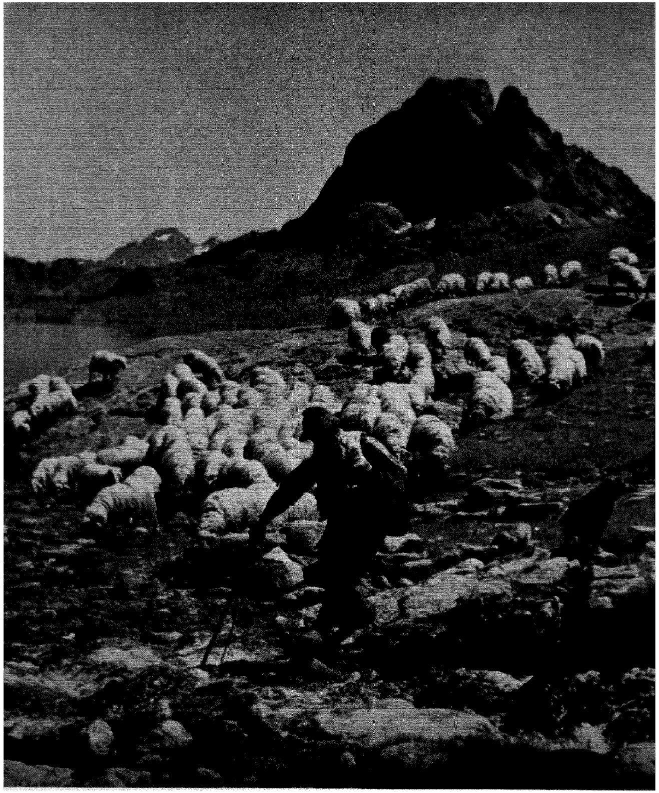


Plate 30. Mountain pasture in Haute-Savoie

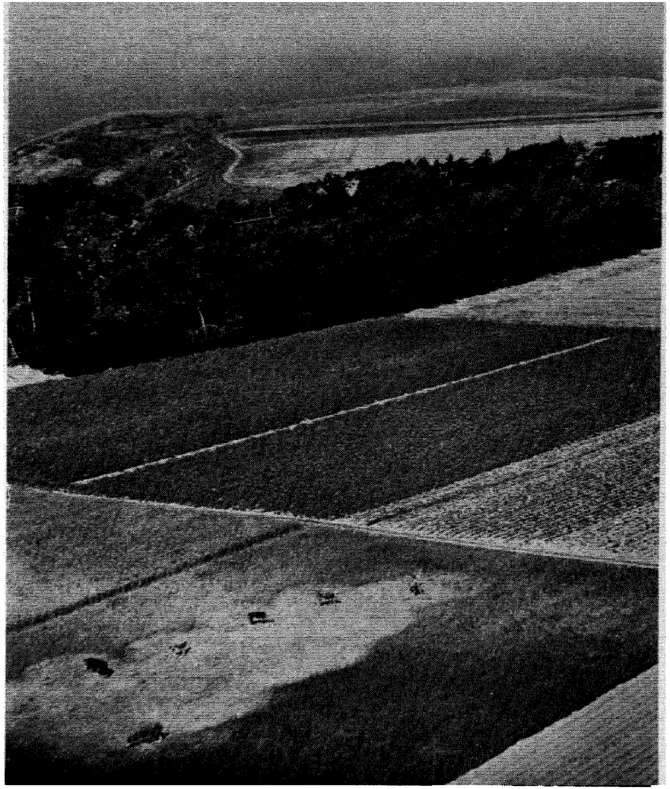


Plate 31. Cattle grazing in Brittany

These two plates show the contrast between scanty mountain pastures, where sheep roam over wide areas, and rich cultivated *prairies artificielles*, where restricted grazing by tethered cattle is part of a mainly arable farming economy.

co-operate to maintain the farms in the best possible condition. In other parts of France, such as the Sologne, farming is spoilt by sport, and the farmers, who are entitled by law to receive compensation for damage, often live on the compensation.

Métayage, or share-tenancy, is a system whereby the landlord provides the farm, implements and livestock and in return takes half the produce as rent. The landlord may be a landed proprietor, an absentee capitalist, or sometimes a small farmer who has invested in a second holding. There has been a considerable decline in the system in the last hundred years, and only in the departments of Landes and Allier is over half the agricultural area cultivated on this system. Its disadvantages are obvious, for it encourages wasteful cultivation; the tenant is tempted to put in as little and to take out as much as he can; insecurity never makes for good farming. A hard-working single man can earn more as a hired labourer and therefore save enough to buy his own holding in due course. The *métayer* is usually a man who has no capital but can utilize the labour of a large family.

France is a country of smallholders; in 1931, 85·1% of the total number of holdings were less than 10 ha. in area. On the other hand, the remaining 14·9% of the holdings occupy nearly three-quarters of the total area of France (excluding forests).

Size of holding (in hectares)	Number of holdings	% of total	Area of group (hectares)	% of area of France (less forests)
0–1	2,235,405	39·2	1,327,300	2·6
1–10	2,617,558	45·9	11,244,700	22·8
10–50	764,461	13·5	36,806,800	74·6
50–100	52,048	0·9		
Over 100	33,280	0·5		
Total	5,702,752	100	49,378,800	100

The larger holdings are almost entirely in the north-east (Fig. 57) and are devoted to growing sugar beet. Around Soissons, for example, the farms are from 300 to 400 ha. The number of large holdings has decreased during the last 40 years. Some of them were broken up in 1918 in default of heirs, or because of shortage of labour or lack of capital. Holdings of under 2·5 ha. are mainly in the vine areas. The most typical is that of 10–25 ha. with a mixture of horticulture, agriculture and livestock, and this type occupies nearly half the total cultivated area. The smaller grower is favoured by the Wheat Growers' tax which was imposed in 1938 and which is on a sliding scale, rising sharply with an increase in the area of the holding.

The problem of the prevention of the continual splitting up of the holdings due to the laws of inheritance has given rise to many difficulties. While the principle of the equal division of property among the children had been practised in some districts before 1789, Napoleon's Civil Code enforced this. Although some children might be bought out, subdivision inevitably increased. In the department of Meuse, for example, one farm of some 30 ha. was divided into about 2,000 'parcels', with each peasant owning twenty or thirty scattered about the whole holding. There have been various attempts, none of them very successful, to meet this problem (pp. 133–4).

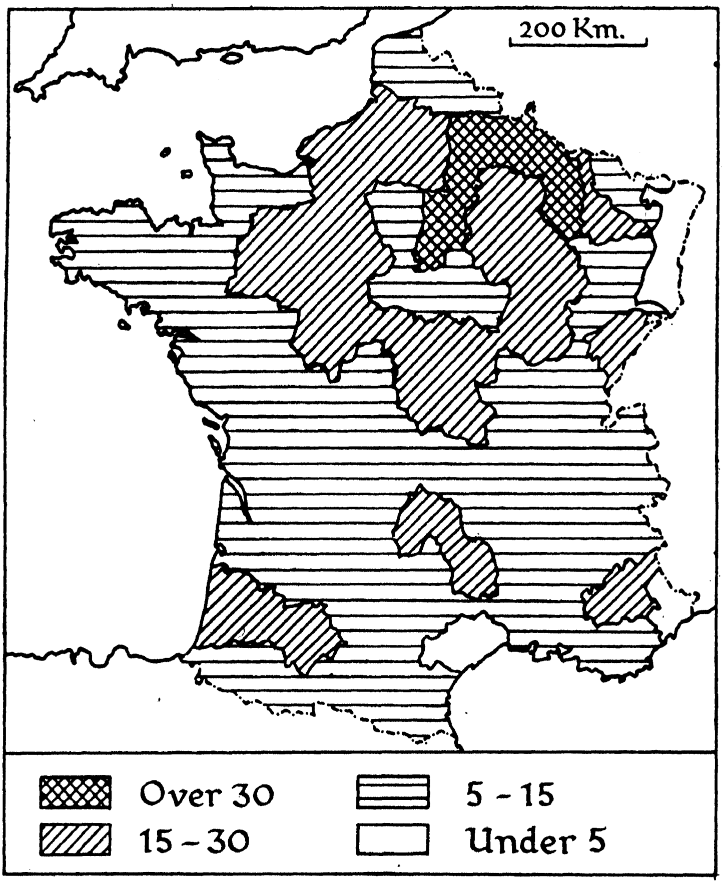


Fig. 57. Average size of holdings in hectares, 1930, by departments

LEGISLATION

France is divided for the purposes of agricultural administration into eight regional offices responsible to the Minister of Agriculture. A regional office in turn has the general supervision of the departmental offices within its area. A departmental office is directed by five representatives of the agricultural interests of the department and is managed by trained agriculturalists.

General Policy. The state's agricultural policy has consisted of a spasmodic series of relatively unrelated schemes. Direct subsidies have furthered large schemes such as rural electrification, water supply, road and rail improvements, and the use of fertilizers. There has been a gradual improvement in agricultural inspection, in the registration and compilation of production returns, and in the establishment of agricultural schools, research stations and breeding establishments.

Finance. Almost one-half of the agricultural population are borrowers who obtain credits from the National Mortgage Bank (*crédit foncier*) or from the numerous agricultural credit banks, through which direct state loans are made. Other sources are the solicitors and merchants connected with agriculture, and the Joint Stock Banks, together with private organizations such as Peasants' Unions, the Durand Banks and the co-operative banks of Alsace and Lorraine.

Labour. Some effort has been made to improve the lot of the rural worker. Between July 1929 and November 1932 a series of regulations dealing with the accommodation of labourers were passed, and in March 1932 the extension of compulsory family allowances to include agricultural workers was effected. In December 1932, the law enforcing the submission of disputes between employer and employee to a conciliation board (*conseil des prud'hommes*) was applied to agriculture. It had already been operating for industrial disputes. To strengthen the employer's position, a law was passed in February 1932 whereby a former employer might secure damages from the new employer in the event of a labourer breaking a contract to change his job. This helped to check the evil of enticement.

The Size of Holdings. Efforts have also been made to meet the problems of division of property by inheritance. In 1908, a law was enacted which allowed a holding not exceeding the equivalent of £320 to be registered as inalienable. But this figure was much too low and subdivision had already gone too far when it was reached. Regrouping with all its saving of time and efficiency could only really be accomplished by energetic individuals through sale, marriage or exchange. Clearly, a single person could spoil any scheme by withholding his consent. A state-sponsored regrouping scheme in 1919 helped but little, as a majority vote of a commune was still necessary before the state could take the necessary steps. When a commune agreed to a regrouping scheme, the government paid 80% of the cost of regrouping as a direct subsidy. As a result, about 600,000 ha., chiefly in the north-east, were regrouped between 1919 and 1929. In 1935, a further act was passed to simplify the procedure for regrouping, but as the initiative is still largely left to the peasants little has been done.

Protection. The state has also pursued a strong policy of protection and encouragement of home agriculture by imposing tariffs and import quotas on a wide variety of agricultural produce, including specified items from particular countries. The problems of over-production at home have been partially tackled by restrictive area quotas and by marketing regulations. The measures adopted towards the two most important commodities, wheat and wine, illustrate the nature of the difficulties and the efforts to overcome them.

In the case of wheat, the outstanding problems in recent years have been those of over-production and of marketing. During 1931 and 1932, imports were still much above average (Fig. 42) in spite of the tariff, while subsequently there were good crops in the years 1932, 1933 and 1938. Efforts were made to limit surpluses by putting growers on an area quota; a 'Wheat Commission' was instituted to dispose of surplus supplies and a minimum selling price was fixed, although in practice it could not be enforced. In 1935, the establishment of new flour mills was forbidden. In 1936, a 'Wheat Office' with local branches was set up to deal with problems of over-production and marketing. Growers were compelled to state the area they had sown and the quantity of wheat harvested; apart from their own consumption, they had to sell to the local co-operative society (Plate 18) or to a licensed dealer. In 1938, the harvest was good and a surplus was the result. To deal with this a tax on producers was imposed.

The great over-production of wine, the obstacles to its export and increasing imports have led to several legislative attempts to meet the situation. In July 1931, it was enacted that no individual or undertaking in France or Algeria owning 10 ha. or harvesting 500 hl. should plant any more vines for 10 years, and fines were imposed on excessively high amounts. The first of these measures was abrogated in the same year as its imposition, but it was re-enacted in July 1933, when for a period of 5 years no increase of vineyard area was to be

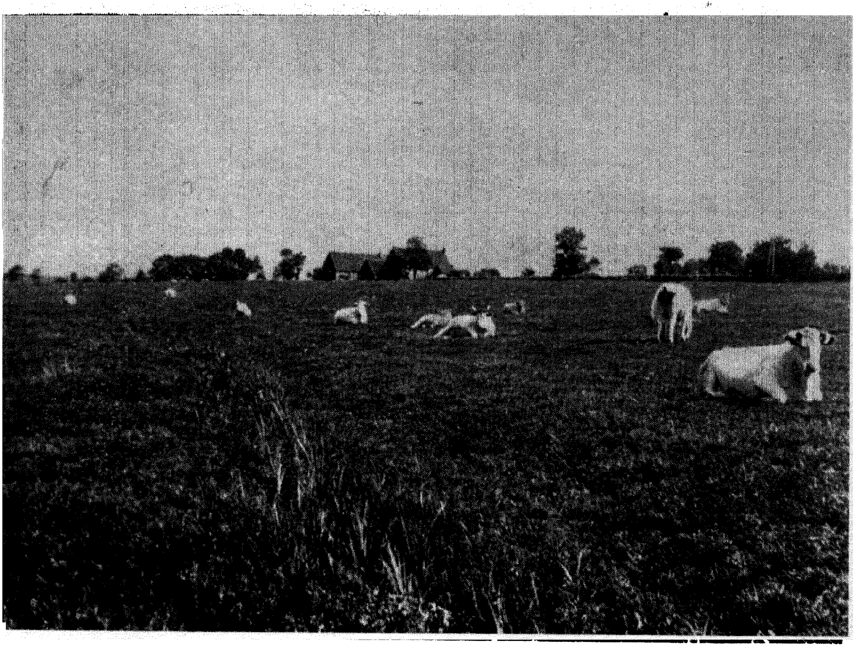


Plate 32. Grazing on the Charolais plateau

Rich pastures on Jurassic limestones are utilized to fatten the famous white Charolais beef cattle.

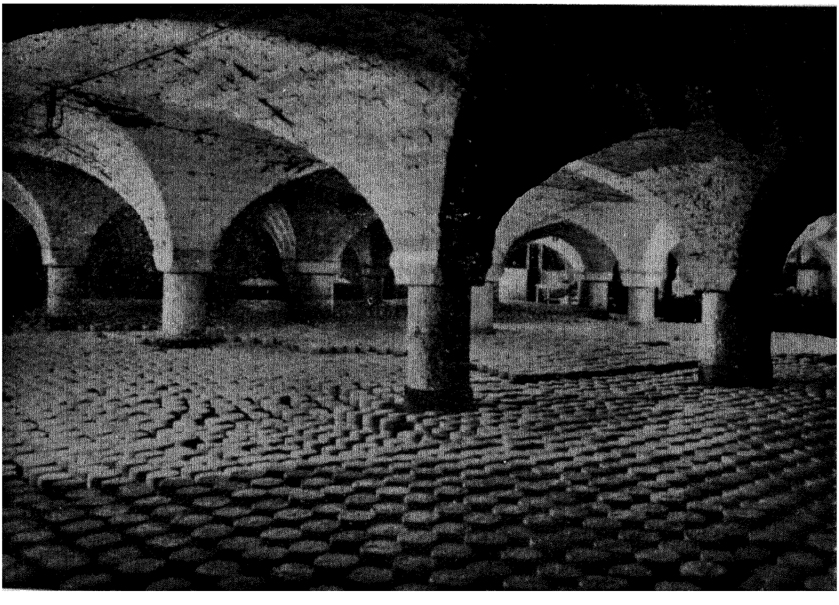
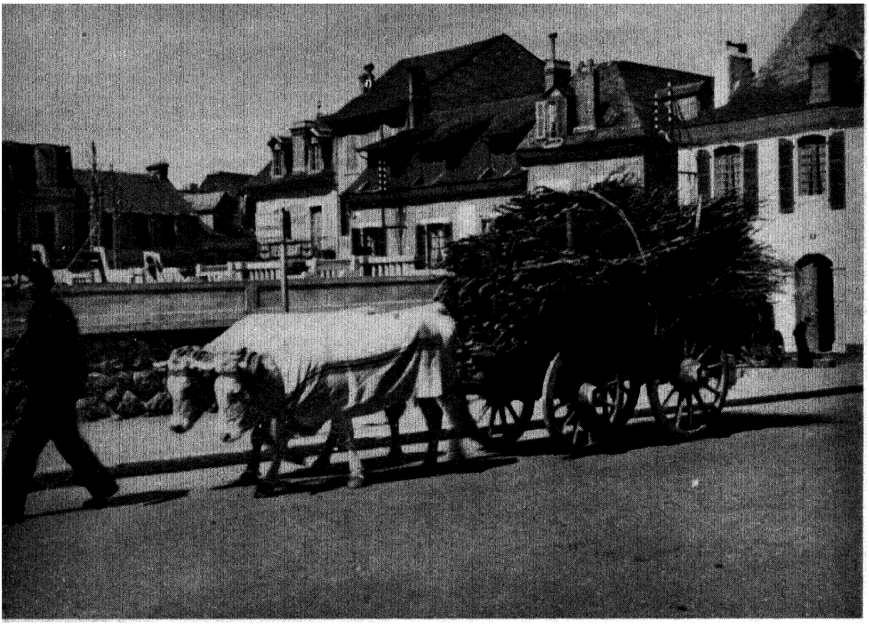
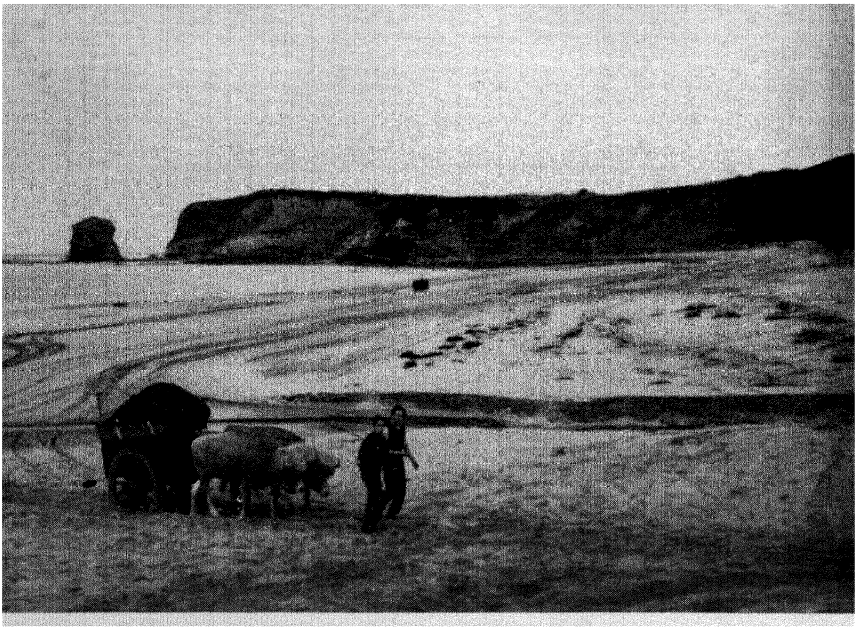


Plate 33. A cheese cave at Roquefort (Aveyron)

Cheeses, made from sheep's milk, are matured in caves hollowed out of the limestone cliff, on the slopes of which the town of Roquefort is situated.





Plates 34, 35. Ox transport in southern France

Oxen are used extensively as draught animals in many parts of France, notably in Aquitaine. Plate 34 (above) is a scene in St Jean-de-Luz. Plate 35 (below) shows the collection of seaweed on the coast at Hendaye; it is spread on the nearby fields as a fertilizer.

allowed. In July 1932, a system of 'blocage' was put into operation whereby the government was empowered in the event of overproduction to fix the amount of wine to be put on the market. In that month no grower harvesting 500 hl. could sell a quantity of wine exceeding two-thirds of his total harvest. Each producer of wine had to register and obtain permits for the sale of produce, while the local Marketing Committee had to release the output as the market could absorb it and thus maintain a minimum price. The whole system hits the larger producers who have to release part of their crop to distilleries at low prices, while the small producers are able to sell at much better prices in the open market. In 1934, cultivators were paid the equivalent of up to £40 per acre for the destruction of their vineyards, but they were not to replant or to grow certain other specified crops, notably tobacco, flax and sugar beet.

Owing to the fact that the majority of growers have holdings less than 1 ha. and are therefore largely untouched by legislation, the schemes to restrict vineyards are ineffective; there was more land under vines in 1938 than at any time since 1913.

French growers have long agitated for a restrictive quota on imported Algerian wine, as the lower costs of production and the large export from the non-wine-drinking Mohammedan population, together with freedom from foreign import duties, affects adversely the home industry. But up to 1936 no legislation had been effected.

FORESTS

Of the total surface area of France about 10½ million ha., that is 19·4%, are forested (Figs. 58, 59). Similar figures for Great Britain are 1¼ million ha. and 5·4% respectively. The woodland is scattered over the whole country, with concentrations partly in certain parts less suitable for cultivation, notably on the bleak exposed uplands and on coarse sandy soils, and partly in preserved state-owned areas. Sixteen departments in 1938 had over 30% of their total area under wood (Fig. 58). In some districts, however, chiefly in the north-west and north-east, forests which once existed on well-drained lowlands have been removed by centuries of intensive cultivation, and woodland now exists only as coppice.

Of the French total of 10½ million ha., 14·4% is state forest, comprising chiefly the afforested areas, and are well maintained by the department of *Eaux et Forêts*, which administers them under a code of forest law.

Another 20·9 % belonging to communes and public bodies are also administered by the same department, while the remainder (64·7 %) is in the hands of private individuals. The proportions of coppice, deciduous and coniferous woods may be seen from the following table:

Forests of France, 1929. *Thousands of hectares*

Coppice	Deciduous	Coniferous	Total	Recently planted	Total
6,480	1,122	2,777	3,899	292	10,671

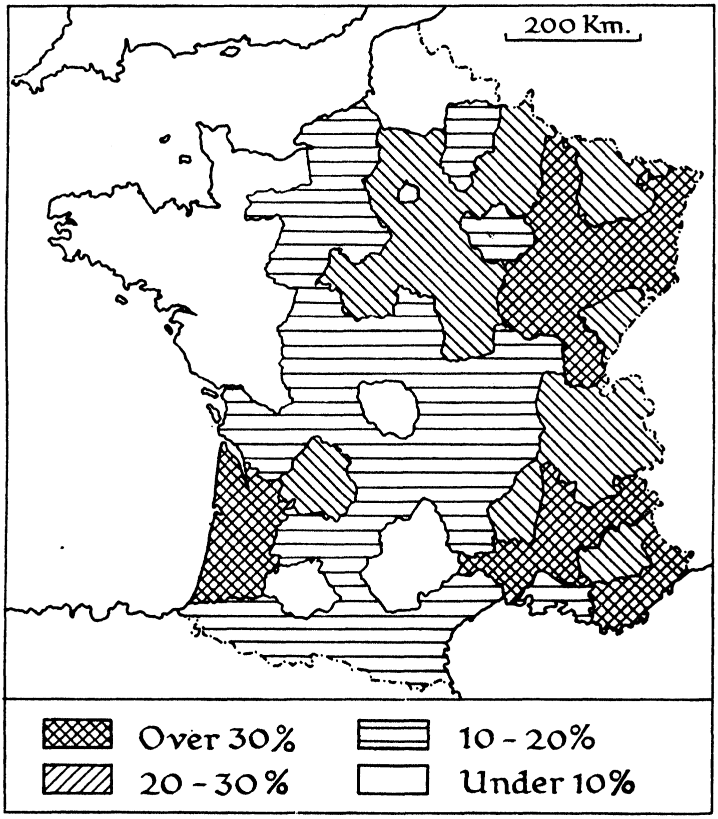


Fig. 58. Percentage of area covered with woodland in each department, 1938

The forests may be divided into three main groups, namely, the Mediterranean type in the south-east, the cooler temperate forest of the Atlantic seaboard and hinterland, and the upland forests. Although there is a considerable diversity, areas of certain dominant species may be broadly distinguished.

The major areas of natural woodland will first be considered, then the regions where extensive afforestation has taken place.

Natural Woodland

(1) *The Mediterranean Forests*

These may be divided into two groups, those in Provence and in Languedoc. In the former area, the Aleppo and maritime pines are indigenous and occur in uniform stands. There are also many exotics and tropical plants in the parks and gardens of the Riviera coast. In Languedoc both coniferous and deciduous trees are represented; they include various species of pine, several varieties of evergreen oak and edible chestnut. Other deciduous trees scattered more generally are the lote-tree, some varieties of ash, poplars along the banks of the Rhône, planes, Montpellier maples and alders.

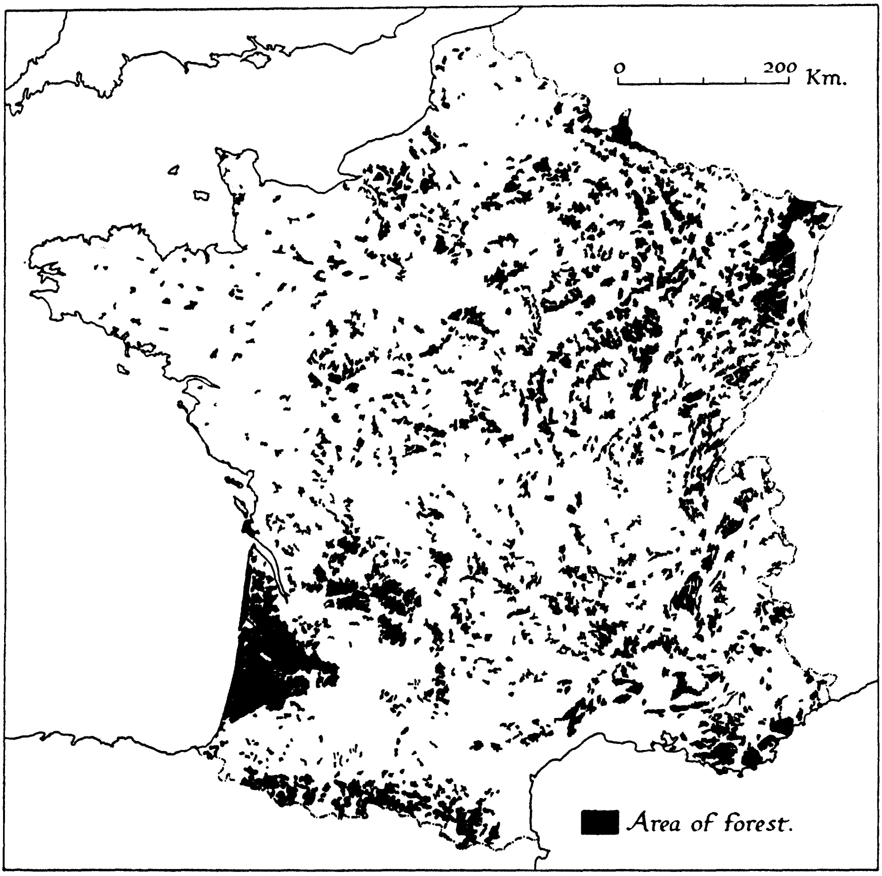


Fig. 59. Distribution of woodland, 1932

Based on the *Atlas de France*, Plate 38 (Paris, 1935).

These southern woodlands have been extensively ravaged in this area by cultivation, by past exploitation for shipbuilding, by overgrazing and by several disastrous fires. In many places a secondary growth has established itself—*garrigue* on limestone and *maquis* on siliceous soils. The words themselves are sometimes used to denote the type of country as well as the type of vegetation. *Garrigue* is found mainly to the west of the Rhône in Gard and Hérault, on limestone plateaux averaging 150–300 m. but reaching 800 m. in places; they are also found behind Toulon. In garrigue the dominant plant is the stunted kerm oak, which grows in thickets, but many other plants thrive—grass, thyme, and more often shrubs like lavender, juniper and cistus (rock-rose). Areas of rock and stony soils bear the arbutus (strawberry tree), laurel and mastic trees, and the asphodel. The majority of these plants are remarkable for their strong scent. Thus garrigue country has a rich variety of plants, and belies a first impression of desolation and poverty. All garrigue plants possess drought-resisting features such as thorny structures, or leathery, shiny or curled leaves, or long roots. The drought which limits the growth and type of vegetation results from several factors: a thin soil covering, the permeability of limestone rock, the rapid run-off of rainfall, and the high temperatures and excessive evaporation which prevail during summer when rainfall is lowest.

The *maquis* is less varied than the garrigue. The country east of the Rhône has more frequent silicious rocks (sands and marls), and here the maritime pine is dominant. These pine forests permit the development of a very dense shrub vegetation of cistus, arbutus and broom. Growing in a less permeable soil, the plants have not such pronounced drought-resisting features as garrigue vegetation. The dry nature of the vegetation as a whole and the resin secreted by the pines make the maquis particularly liable to the danger of fire.

These two vegetation groups have a complicated history. In Languedoc the garrigue is the work of man; the original natural vegetation included many woods of ilex or holm oak, protecting the thin soil which nourished them. Destruction of these valuable trees permitted soil erosion, and on the resulting stony uplands they were followed by thickets of stunted kerm oak. In places where many successive fires have occurred the garrigue is replaced by grass steppe, and with overgrazing even this fails to replace itself, and gives way to the final triumph of the asphodel. If, on the contrary, the grass cover is not grazed by animals, it is invaded by thickets of kerm oak, which eventually allow the return of the ilex oak, first in copses, then in forests (though a forest is rarely given time to recover in this way).

The kerm oak was formerly more widespread, and in the eighteenth century many oaks still survived in the inland parts of the Maures. The progressive removal of these more valuable trees allowed the pine, a latecomer, to take root. The oak has been able to colonize successfully only the limestone country which is unsuited to pines. In the Maures and Esterel massifs, east of the Rhône, abandoned agricultural clearings are invaded first by kerm oaks, but these are in turn stifled by the pines coming back to reconstitute the maquis. Once the maritime pine has secured a foothold it rarely retreats; in spite of fire it replaces itself without human intervention, and the dense closed vegetation of the maquis which follows is able to stifle any oak seeking to re-establish itself in its former territory.

(2) *Temperate Forests*

The undulating plains and hills of the Atlantic seaboard and its hinterland are covered with deciduous trees except where coniferous afforestation has taken place. These temperate forests cover three-quarters of the total area of France and may be conveniently divided into two regional groups, namely:

(*a*) Aquitaine and the south-western plain.

(*b*) The north Atlantic coast, the Paris Basin and north-eastern France.

(*a*) *Aquitaine and the south-western Plain.* This area is climatically a transition zone between the maritime temperate and Mediterranean regimes, and as a result the vegetation exhibits transitional characteristics. Several species of the southern deciduous trees are found, including the cork oak on the siliceous soils south of the Garonne, the Montpellier maple as far north as Poitiers and Niort, the ilex oak and the pubescent oak in the south, and the pedunculate oak in the lower valleys. Elms and beech occur notably in the forests of Chizé and Aulnaye. Conifers, apart from the great afforested Landes (see pp. 141–2), are represented by scattered patches of pines on the hills.

The natural forests on the whole are not extensive, as much of the region is under vineyards, market gardening or permanent grazing.

(*b*) *The North Atlantic Coast, etc.* The dominant species of this extensive zone are the pedunculate and English oaks, although most of the temperate deciduous trees are represented. Beech trees are common everywhere except in the Loire valley. The fine old domanial forests are largely made up of the two oaks. The mild winters allow the persistence to an unusually northerly latitude of some of the southern evergreen trees. Many conifers have been naturalized, especially on sandy areas such as the Sologne (see p. 142), but only in rarer places on the uplands, notably in Alsace, are they indigenous.

Some of the largest individual forests other than the afforested areas occur in this region. They include the Forests of Orléans (34,344 ha.) and Fontainebleau (16,855 ha.).

(3) *Upland Forests*

The forests covering the bleaker upland areas are predominantly coniferous, although numerous deciduous trees, mostly beech and ash, occur on the lower slopes. Three main altitudinal zones may be distinguished which vary in height with the latitude of the upland. They comprise a lower zone of firs, pines and beech, a middle zone of larch and Arolla pine, and an upper zone where occur alpine meadows, bushes and isolated dwarf trees. As a rule, however, the tree-line is clear-cut and distinct.

In the Central Massif the main forests occur between 600 and 800 m. and the upper tree-line is at about 1,200 m. The summits of the uplands range from 1,400 to 1,886 m. and are covered with alpine pasture. Besides a variety of pines, the beech dominates in the Morvan and Montagne Noire, and the sweet chestnut flourishes on the crystalline rocks.

In the Vosges and Jura the tree-line is at 1,200–1,300 m.; beyond this are summit moorlands and pastures devoid of trees. The forests of conifers are extensive on the plateaux from about 700–800 m., while deciduous trees, including maple, plane, mountain ash, mountain elm and beech, are scattered on the lower slopes (Plate 36).

In the Alpine regions the upward tree limit varies considerably according to aspect and district, from about 1,800 to 2,400 m. In the damper northern section the chief tree is *Picea excelsa*, while species of fir cover the valley sides and the lower pre-Alp summits. Below 1,000 m. occurs a mixed coniferous and deciduous woodland, including maple, elm, ash and birch. In the southern section the larch is much more abundant, but the fir and beech are less frequent because of the diminished moisture. The larch, Arolla pine and evergreen alder are often found near the upper limit of tree growth. The woods are less extensive than in the northern section.

The higher forests of the Pyrenees are similar to those of the Alps, the lower ones similar to those of Provence. The tree-line varies between 2,000 and 2,400 m. The cork oak forms extensive evergreen woods on the lowest slopes; higher up, where there is more rain, are dense thickets of kerm oak; chestnuts and beech grow up to 500 m.

with here and there ash and elm; varieties of fir and pine occur up to the tree limit.

Afforestation Policy

The extensive planting of trees as part of a definite state policy has been carried out in many parts of France in both upland and lowland areas. This afforestation has aimed at reducing the country's extensive imports of soft woods and pulp, at making good the forest areas ravaged in the last war, at fixing the sand dunes of the Landes and at combating rain wash and torrent erosion. Conifers are used almost exclusively for artificial plantation as they will grow in almost any physical environment, will reach maturity relatively quickly and will yield a variety of products. The upland areas so planted are chiefly in the Alps and the Central Massif, while outstanding lowland plantations are in the Landes, the Sologne and the *Champagne pouilleuse*.

In the *Alps* afforestation began in 1860 as a defence against soil erosion. By 1929, the state had purchased 189,768 há. of land and had planted 110,000 ha. of these. A further 89,660 ha. are on schedule to be purchased as future state forests. An additional 32,000 ha. have been planted by individual owners with state help. In the Alps few extensive single state forests have been planted, as no arrondissement or commune is unwooded and afforestation usually takes the form of connecting scattered natural forest.

In the *Central Massif* the most notable work has been done in Aigoual south of the Cévennes, where between 1856 and 1931 the state acquired and planted 13,766 ha. Five-sixths are conifers, but beech, chestnut, ash and some varieties of oak have also been planted. The state delivered 65 million young trees between 1863 and 1933 from the nurseries in the Rhône valley to various communes in the Massif. In the Puy-de-Dôme 22,000 ha. were planted between 1843 and 1934. On the Montagne Noire and the plateau of Millevaches (Limousin) future afforestation schemes aim at planting some 90,000 ha. of the total uncultivated area of 110,000 ha.

The *Landes*, which consist of sand dunes, marsh and gravel soils, were very scantily wooded from ancient times. At the end of the eighteenth century there were only a few scattered maritime pines and some dwarf oaks. The physical nature of the terrain made cultivation impossible. In 1783, a few experiments were made with little success, but in 1857 drainage by canals was begun in some places. In 1862, the department of *Eaux et Forêts* was given charge of the area to combat the invasion of the dunes. A dune wall 8–15 m. high was built along the coast, about 150 m. behind the highest tide-mark. The hinterland was planted chiefly with maritime pine, and smaller plants were used to fix the terrain. This woodland now covers 956,000 ha. and is by far the largest and most continuous forested area in France (Fig. 59). Owing to a high resin content, the trees are not suitable for pulping; this resin is collected and forms a valuable product (Plate 37). The thinnings are used as pit-props; larger trees when injected with copper sulphate make durable sleepers; mature trees are utilized as constructional timber of all kinds. The necessary drainage has transformed the unhealthy malarious moorland and fen. Population is of course still small, as forestry maintenance does not require many employees, although there are open areas where maize is grown and dairy cattle reared.

The *Sologne* is covered with coarse sand which often lies on clay, and marsh with shallow sheets of water is common. An ancient forest of deciduous woods covered half of it in past years, but by 1800 it had been reduced to one-tenth of its former size. By 1830, however, the forest as a result of planting covered 120,000 ha., of which 72,000 ha. were coniferous. In the winter of 1879 and 1880, a disastrous frost killed most of the maritime pines, so when reafforestation began again other varieties of pine were first used and then Douglas fir. By 1914, the Sologne had 170,000 ha. of timber, but nearly half was felled during and immediately after the war of 1914–18. Although afforestation began again, in 1930 the total of 159,000 ha. was still substantially below the pre-war level; another 90,000 ha. are scheduled for planting.

The *Champagne pouilleuse* is over 700,000 ha. in extent; it is little cultivated as the soil is thin and chalky, and the land is utilized almost solely for grazing. Much work has been done by private initiative and many thousands of hectares have been planted with pine, birch, willow and alder, and with oak on the better soils. By 1914, 100,000 ha. had been planted, but these suffered badly owing to excessive felling during the war of 1914–18. Planting now has almost made good the losses.

The *Verdun district* in Lorraine was also terribly devastated during 1914–18. Even the rock was sometimes bared by explosives, and 14,000 ha of forest were destroyed. By 1938, 12,400 ha. had been reafforested.

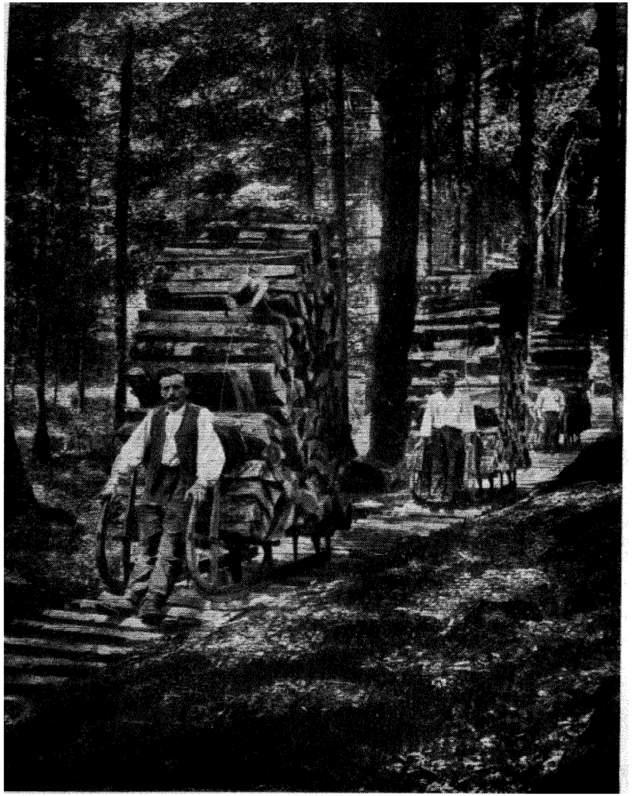


Plate 36. The timber industry in Alsace
In the dense forests of the Hohwald, sawn timber is conveyed by sledges on rough wooden runways.

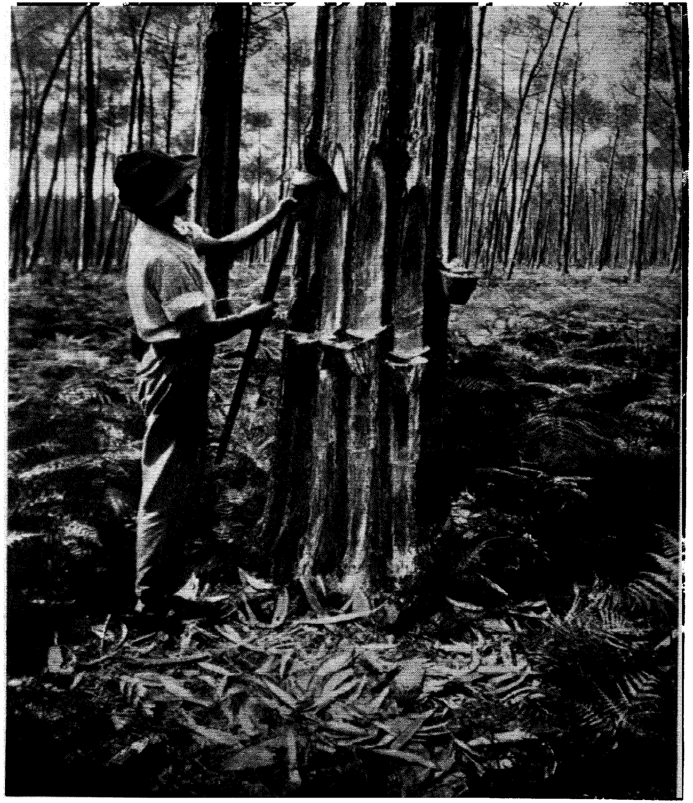


Plate 37. Resin collection in the Landes
The resin which accumulates in the cups is collected weekly.

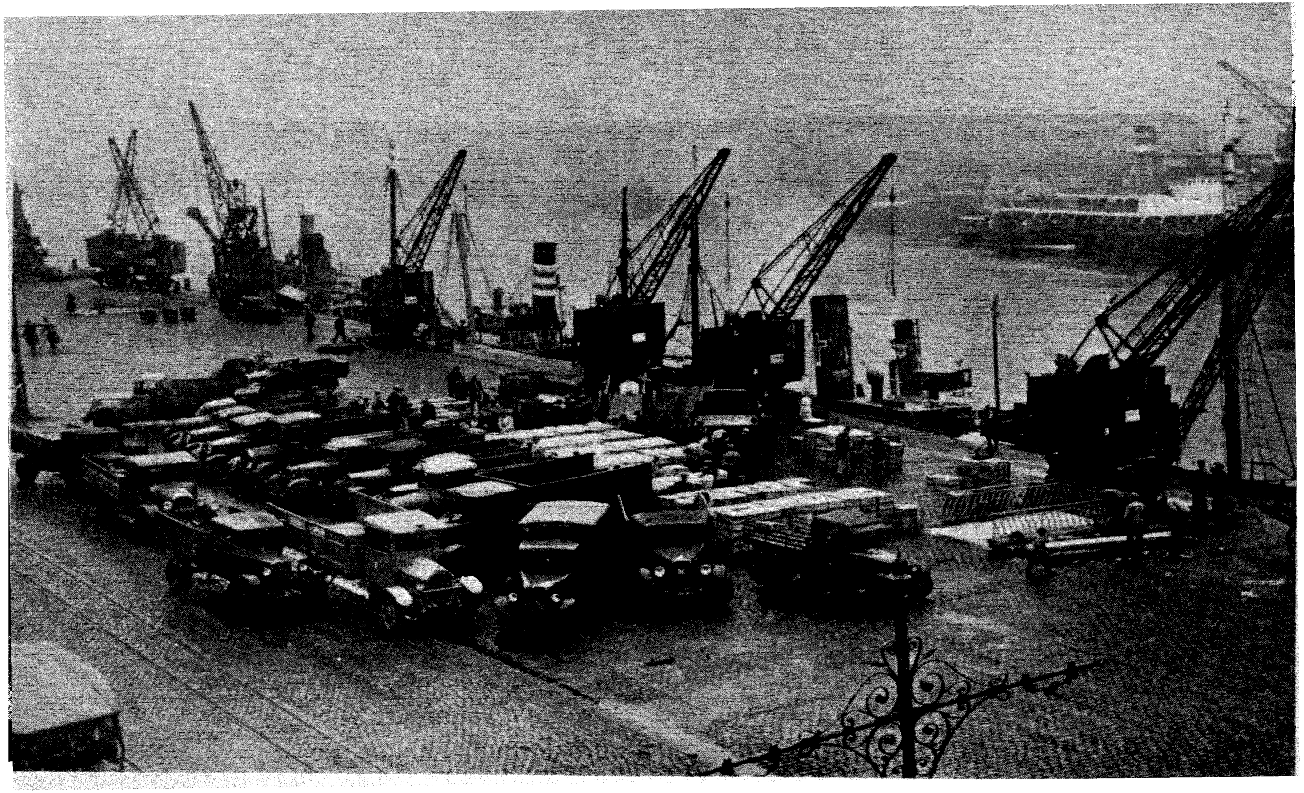


Plate 38. Fish traffic at Boulogne

Fish traffic is dealt with in several parts of the port; the view shows the Quai Gambetta, looking across the Port de Marée. In the background is the long building of the fish market; the passenger steamer is lying adjacent to the Gare Maritime.

The Vichy Regime

The harvest of 1938 was good, and large surpluses of wheat and other cereals were stored for possible national emergencies (see p. 110). In 1939, the areas under crops showed a small decrease, due largely to the disruption of economic life by the mobilization of September–October 1938. When final mobilization began in August 1939, the harvest was in progress. Although delayed considerably by the immense drain of man-power from the land, it was completed by older men and youths, by women, and in some areas by troops released for the purpose. The season was reasonably good; the areas of crops were usually well below the record high yield of 1938, but in general up to the average. The following table gives the areas and yields of the commodities for which figures are available; the 1938 figures are appended for comparison:

	1938		1939	
	Area 1,000 ha.	Yield 1,000 quintals	Area 1,000 ha.	Yield 1,000 quintals
Wheat	5,050	98,010	4,727	78,000
Barley	759	12,907	799	9,980
Rye	631	8,111	648	8,060
Oats	3,245	54,574	3,242	43,540
Maize	340	5,786	329	5,230
Potatoes	1,425	173,145	1,382	150,000
Sugar beet	319	79,800	333	85,000

From official sources.

The armistice of June 1940, with its division into occupied and unoccupied territories, upset the internal agricultural equilibrium of the country. The north, where most of the wheatlands are situated, had to bear the burden of the German army of occupation; the hilly south could not feed itself in normal times. Only in Alsace-Lorraine, which was *de facto* incorporated into the Reich, and in the north-eastern plains did the Germans make any substantial effort to assist agricultural recovery. The agricultural situation was made worse by the large number of men held as prisoners of war, by the slaughtering of livestock for the army of occupation, by the shortage of fertilizers and vine sprays, and by problems of transport and distribution. The bad harvest of 1940, together with the increasingly close blockade, produced a considerable shortage of food during the winter of 1940–1; rationing of bread, sugar, butter, meat, wine, cheese, fats, potatoes, macaroni, rice and pulses was imposed. In spite of efforts by the Vichy government, the food situation continued to be critical, and the winter of 1941–2 was a hard one for both unoccupied as well as occupied France.

The problem of food supply was naturally much more acute in the towns than in the country, and various schemes attempted to equalize distribution. Farmers were urged to co-operate with the government; quotas were levied, and bonuses paid for prompt supplies; rigorous measures were taken against the 'Black Market'. Illegal trading in foodstuffs became a vital social question in France; it was stated in December 1941 that supplies coming on to the 'Black Market' were as great as or greater than those reaching the legal markets. Large-scale hoarding by peasants was severely punished but with little effect. Malnutrition, especially among children, was very prevalent in the towns; the death-rate rose, and infantile mortality during the first half of 1941 trebled. Trouble culminated in the food riots of January 1942; they occurred chiefly in the southern departments of Hérault and Gard, where even the small rations could not be obtained. Supplementary rations were issued here and elsewhere.

The situation was helped slightly by shiploads of powdered milk, wheat and other supplies from America during 1941, which were allowed through the blockade by Britain on condition that the American Red Cross and American Friends' Service Committee guaranteed that the supplies should not fall into German hands.

The Harvests of 1940–1

Wheat (see pp. 106–10). Over two-thirds of French wheat is produced in the occupied zone. It was estimated that only about 3 million ha. were sown in the autumn of 1939 for the 1940 harvest—over 1½ million ha. less than in the previous year. Destruction of crops by the military operations in the summer of 1940 was not as great as might have been expected, owing to the mobility of the warfare and to the rapid decision. But even so, some wheat was damaged by fighting, and the flight of so many peasant families caused destruction by neglect. Much of what remained was harvested with the help of the German army. To the south, in the unoccupied zone, the harvest was the worst for many years. The total French crop of 1940 was about 42,500,000 quintals—as against the normal 75 million quintals. As a result, in October 1940 strict bread rationing was imposed in both the occupied and unoccupied zones.

In the autumn of 1940 some 4,100,000 ha. were sown, a 30 % increase on the previous year. During the early summer of 1941 small amounts of wheat went from occupied to unoccupied France, but these were far below what was needed (the deficiency was estimated at 7·8 million quintals in the unoccupied zone), and at the end of May unoccupied France faced extreme hunger. The bread ration was decreased and adulterants were introduced into the flour. The Germans, however, released 2 million quintals out of supplies requisitioned for the army, and this enabled 3 million quintals to be sent by a barter agreement from occupied to unoccupied France; 700,000 quintals were imported from North America, and 145,000 quintals came from America. At the end of June 1941, the bread ration was restored to a normal level (275 grm. or less than 10 oz. per day). The 1941 crop was estimated to be about 65 million quintals, which was more than in 1939 but still well below average.

Other cereals (see pp. 110–13). Nearly all the *oats* are grown in northern France. The harvest of 1940 was poor and totalled only 30 million quintals, or about three-quarters of the 1939 yield. In 1941, the yield improved to about 35 million quintals. The amount used as fodder was drastically reduced, and Germany requisitioned large quantities. The poorer cereals, *millet* and *rye*, which are mainly grown in unoccupied France on the Central Massif, were a little below normal in both years, but they feed only a small proportion of the population. The Germans claimed an increase in the acreage of rye in the occupied zone. Most of the maize comes from unoccupied France. Some 3,400,000 quintals were harvested in 1940, that is, just over half of the previous year's total. No figures are available for the production of *barley*, but here again the Germans claim an increase in 1941 in the occupied zone; this cereal follows the trend of the wheat yield quite closely, so that the 1940 crop may be estimated at 4–5 million quintals, with about half a million more in 1941.

Potatoes (see p. 111). The potato crop of 1940 amounted to about 90 million quintals, and in 1941 to about 120 million quintals; both compare unfavourably with the average pre-war yield of about 160 million quintals. In many parts of France potatoes form a staple part of the diet, and a shortage has serious consequences. In September 1941, the government tried to supplement the insufficient rations of bread and meat by as large a ration of potatoes as possible. Compulsory purchase quotas from producers were introduced, and farmers who refused to sell their quota to the government became liable to three years imprisonment. A bonus of 5 fr. per quintal was paid, and urgent appeals for co-operation were made so that requisitions would not be necessary. The Germans distributed small quantities of potatoes in 1941, ostensibly from their own but more probably from French stocks.

Sugar beet (see pp. 111–13). Almost all the land under sugar beet and all the refineries are in occupied France; the crop suffered considerable damage during the war and there has been a great shortage of sugar, with resultant stringent rationing. In 1940, only 114,000 ha. were harvested from a planted total of 271,000 ha., and the total produced was estimated at 46 million quintals; this figure compared very unfavourably with the 1938 total of nearly 80 million quintals. There was some improvement in 1941, and the output was estimated to be nearly 70 million quintals. The sugar ration in unoccupied France remained at 500 grm. (about 17 oz.) monthly, but that figure was still much below the peace-time consumption.

Wine (see pp. 113–18). The total yield of wine was about 85 million hl. in 1939; in 1940 and 1941, it was estimated to be about 60 and 45 million hl. respectively, which compared unfavourably with the normal average of 70 million hl. Most of the French fine wines, with the exception of those produced in the Burgundy district, come from occupied France. Most French *vin ordinaire* comes from the unoccupied zone, and this output has not been appreciably reduced. It was estimated that 10 million hl., or about one-sixth of the total peacetime output, were requisitioned during 1940 for the German army of occupation. The grapes of the famous vintage areas were grown and processed more casually to produce cheap wines for general consumption.

The industry suffered greatly in 1940 owing to the shortage of skilled labour, and the grape harvest was rarely completed. In 1941, disease was widespread due to the lack of copper sulphate for spraying; in Burgundy, for example, the grapes were almost completely ruined by mildew. On the other hand, vine growing in Alsace has benefited; the area of vineyards in 1940 was 16,000 ha., nearly 1,000 ha. more than in 1939. This development of Alsatian agriculture has been part of German policy. The 30,000 families engaged in viticulture have gained by the elimination of cheaper French wines, which had steadily reduced the Alsatian vine area in pre-war years.

In September 1940, the Vichy government introduced new regulations for vine growers. Every vineyard of more than 5 ha., or producing more than 500 hl., was obliged to grow crops other than vines on one-tenth of its land. Growers producing more than 200 hl. were to keep 20 % of their grape 'must' for turning into sugar, and those producing more than 50 hl. of pure alcohol had to keep the grape pips for the production of vegetable oil. There was much trouble during 1941 over the distribution of wine, resulting in a clash between the interests of the growers and the government's wine policy. Wine growers asked for higher prices, for more government assistance, and for less requisitioning. General suspicion attributed the shortage of supplies to the sale of requisitioned wine by Germany through neutral firms in Switzerland and Portugal to America. The official explanation was that production for 1940–1 had been abnormally low while consumption had increased, and little had come from Algeria owing to transport difficulties. Severe rationing was introduced at the end of 1941; normal consumers were allowed 1 l. a week and heavy workers 5 l.

Other crops (see pp. 118–20). Efforts were made to increase the cultivation of vegetables generally—of haricots, of soya beans and of other oleaginous plants, of flax, of hemp and of green feeding stuffs. The chief disabilities were shortage of labour, of seed, of fertilizers, and of tools. The only conspicuous increase has been in the case of flax; the area of this crop was 65 % greater in 1941 than in 1938. Otherwise only in Alsace-Lorraine, where the Germans have supplied these wants, was produce up to pre-war standard. The development of agriculture in Alsace-Lorraine was dominated by Germany's needs; the area under tobacco, for example, was maintained by the German tobacco firms which purchased and prepared the entire crop. The winter cultivation of oil seeds (including rape), which had been negligible before the German regime, was increased to 1,900 ha. in 1941 and to 3,500 ha. in 1942. On the other hand, hop cultivation was reduced by 1,000 ha. to avoid competition in the German market.

Livestock (see pp. 120–6)

The majority of *cattle* in 1938 were in the north (see pp. 120–4 and Fig. 48), but large numbers were slaughtered to supply the army of occupation, which drew a large part of its meat from France. Shortage of imported feeding stuffs also caused extensive slaughtering. Unoccupied France in 1938 had only about a quarter of the total French cattle, chiefly dairy herds in the Central Massif, Alps and Jura. It was estimated that even if the total number of milch cows had not declined, the milk output would have been reduced by 15–20 % because of the shortage of oil cake and of other feeding stuffs. Thus there was a great shortage of milk, cheese and butter. In September 1940, cattle were redistributed to compensate areas where herds had been destroyed owing to the war. The German authorities tried to replace the Lorraine livestock which had been destroyed during hostilities by importing animals from Germany, Holland and Denmark, and in December 1940, 11,000 head of cattle bought from Switzerland and Austria arrived in Strasbourg. Efforts were made in unoccupied France to grow lucerne and roots for fodder. Nevertheless, the total number of cattle in both zones decreased by 25 % between September 1940 and April 1941; in August 1941, it was stated that the herds consisted mainly of young animals which would not be suitable for slaughtering for a long time. By the summer of 1942, the herds of cattle had increased in number compared with April 1942, but the major difficulty continued to be shortage of feeding stuffs.

It was estimated that there was a deficit of only 130,000 *horses* (out of a total of 2½ million) after the armistice, but the German army requisitioned large numbers, and petrol shortage increased the need for horse transport. This deficit was reduced slightly during the winter of 1940–1 by transfers from the army and by imports from Algeria. There is little information about any other livestock, except that in July 1941 the numbers of *pigs* and *sheep* arriving at the Paris market of La Villette were respectively one-quarter and one-half of the total in the same month in 1938. This is probably indicative of peasant hoarding, although the number of pigs in 1941 was some 33–40 % below the pre-war level, due to slaughtering for immediate needs, while sheep were about 15 % below.

The government in September 1941 tried to improve the meat situation by organizing fodder supplies. A plan was drawn up specifying the amounts of barley and oats which each department had to deliver to the departmental agricultural committees for distribution among communes according to the needs of each region. Bonuses were given for quick delivery, and farmers who undertook to carry out government contracts for stock breeding received extra rations of fodder. Nevertheless, the meat ration for January 1942 was cut from 250 grm. (about 8½ oz.) weekly to 180 grm. (about 6 oz.) in the towns, and to 125 grm. (about 4 oz.) in the country; the extra meat ration for heavy workers remained the same. The cheese ration remained at 50 grm. (under 2 oz.) per week, and all fats remained at 450 grm. (under 1 lb.) per month.

Forests (see pp. 135–42)

After the armistice, the department of *Eaux et Forêts* had to face a large increase in timber consumption. This was due to an almost complete cessation of timber imports, and to the necessity of using wood in large quantities to be made into charcoal for producer-gas engines, to manufacture cellulose needed by the greatly increased artificial textile industry, to manufacture wooden shoes because of the leather shortage, and as domestic fuel, as well as for all its normal uses of carpentering and furniture making. It was estimated that the amount of wood used directly or indirectly as fuel increased from 14·8 million cu. m. in 1939 to 30 million in 1941, and that the monthly production of charcoal increased from 15,000 tons before the war to 52,000 tons by the end of 1941.

Soon after the armistice, government forestry camps were established to fell timber on a large scale, and a law of August 1940 obliged all forest owners to increase by 50 % the number of trees they normally felled. During 1941 enormous areas of forested land were cleared. But it was increasingly apparent that this was leading to critical deforestation with its resultant evils of floods, soil erosion and avalanches, as well as to grave shortage in the future. Accordingly a law was passed in January 1942 to deal with reafforestation. It provided that from 250,000 to 300,000 ha. should be planted with trees during the next decade, particularly in the Landes, the Montagne Noire and the Millevaches plateau of the Central Massif. Certain districts would be delineated for compulsory planting, and the landowners would be given the choice either of doing the work themselves with the aid of state subsidies, or of allowing the department of *Eaux et Forêts* to do it.

Labour and Land

An acute shortage of agricultural labour was experienced after the outbreak of war, because the agricultural population was mobilized far more drastically than the industrial. After the armistice the shortage was still worse, as of 1,800,000 prisoners taken by the Germans 1,200,000 were agricultural workers, and few of these have been released.

German Measures. German plans for French agriculture paid less attention to the needs of the French than to the need of a comprehensive plan to increase production through a more intensive exploitation of French resources. France had to supply a large part of European foodstuffs—chiefly fruit, vegetables, wine, wheat, oleaginous plants, flax and hemp. The Germans released prisoners in the occupied zone, and soldiers from the German army were used as farm labourers. The abandoned farms of north-east France were ordered to be cultivated, and detailed instructions as to which crops were to be grown were issued. German overseers were appointed to farm large tracts of abandoned land, using large-scale mechanization. The Germans also ordered much land in the Maginot area, deliberately left derelict for many years, to be cultivated; it is estimated that about 50,000 out of 150,000 ha. were put under cultivation. Many of the people of Lorraine were assigned to abandoned or uncultivated land with a view to permanent settlement as part of the German effort to develop Alsace-Lorraine. Other measures included credit and loan facilities to assist the financial burdens of reconstruction, and agrarian taxes were lightened pending full recovery. In return for this assistance, the Alsatian farmers were required to produce crops in accordance with German plans.

Vichy Policy. French agricultural policy was dominated by two main objects: first, to supply the country with food and to keep down food prices; and second, to assist the farmers in every way possible and thereby strengthen the economic structure of the country. These policies have been carried out in both zones as far as possible, but to a much less extent in the occupied area. The Vichy government instituted a series of measures to meet the situation in the territory under its control, but most of these, however, have not been implemented.

Attempts were made to stimulate a 'back to the land' movement. All agriculturalists and rural artisans were as far as possible demobilized first. Agricultural Associations assisted in the repatriation of people to their lands, and in September 1940 2 milliard francs were advanced by the Treasury through local branches of the *Crédit Agricole* to assist farmers in repairing war damage. Each commune was required to complete within two months an inventory of land left uncultivated for more than two years. The prefect of each department was then authorized to grant such land for a period of nine years to any person of French nationality who could offer adequate guarantees. Preference was to be given to relatives of men killed in the war. No rent was to be paid for the first three years, and after that it was to be only one-half that of similar farms in the same district. Farmers were encouraged to take school leavers, especially those from urban areas, as apprentices; there were 6,000 of these in 1941. The state promised to pay the farmer a subsidy of 900 fr. towards their training. Compulsory land service was instituted for young people between 17 and 21 as a temporary measure. In July 1941, a law was passed requiring the compulsory attendance of all boys and girls not receiving other education at special agricultural courses. The state also assumed powers to requisition men, preferably urban unemployed with agricultural experience, and to draft them on to the land.

A large government works programme for agriculture was set forth in October 1940. It included schemes of electrification, water supply, drainage and land reclamation, and the building of co-operative factories and dairies. Schemes for land reclamation included the development of the Sologne district, and the reclamation of the Crau district in the Rhône delta by the *Compagnie Nationale du Rhône*, to which subsidies have been paid by the state.

Several measures concerned with the organization of the workers have been effected. In December 1940, an agricultural corporation was outlined, providing for the organization of all farmers and agricultural labourers into local unions within each region (see vol. II, pp. 265–71). These regional organizations were to be coordinated by a national committee. Specialized organizations, insurance and credit societies, and co-operatives, were all to be included within the framework of the agricultural corporation. During the winter of 1941–2 a committee of the *Conseil National* was engaged in drawing up the charter of the Peasant Corporation. The importance of the family holding and the development of modern methods through agricultural unions and co-operatives was emphasized. Official policy aimed at reducing the number of farm labourers by giving them holdings. Subsidies were granted towards the improvement of rural housing.

The Vichy government also made some effort to tackle the problem of divided inheritances (see pp. 132–4), and of the reorganization and regrouping of agricultural holdings. It was clearly impossible to carry out a policy of land resettlement in districts where each farm consisted of many scattered strips. In April 1941, a law was passed whereby the prefect could initiate schemes in any department without the previous necessity of obtaining the consent of a village majority. In each commune strips of land were to be grouped into more compact holdings by a committee appointed by the prefect. No strip after regrouping was to be more than 3 km. away from the farmstead. State help was given to provide new buildings for family holdings. In July 1941, the inheritance code was modified to allow small farms to remain undivided at the request of one of the co-heirs.

As a result of all these efforts, it was stated in May 1941 that nine-tenths of the land abandoned in 1940 had been brought back to cultivation, and that since July 1940 the state had advanced 200 million francs directly to farmers and a further 200 million francs to Agricultural Credit Societies for reclaiming waste land.

BIBLIOGRAPHICAL NOTE

(1) Statistics, used both in the text and in the compilation of the maps, are given in two French official publications—the extremely detailed *Statistique Agricole Annuelle* (Paris) and the more summary *Annuaire Statistique* (Paris). Statistics relating to the agricultural population are given in detail for 1931 in vol. I, part 3, of the French census, *Résultats statistiques du recensement général de la population en* 1931 (Paris), and in a more summary form for 1936 in vol. I, part I, the only section so far published.

(2) General descriptive surveys of French agriculture are given in P. L. Yates, *Food Production in Western Europe* (London, 1940), part IV; in H. Ormsby, *France, A regional and economic geography* (London, 1931); in the *Report on France, Department of Overseas Trade* (H.M.S.O., London, 1934); and in L. Michael, *Agricultural Survey of France* (U.S. Department of Agriculture Bulletin, No. 37, Washington, 1938).

(3) Useful accounts of special regions or of aspects of agriculture are numerous; they include French government pamphlets, notably the *Monographies Agricoles* published by the French *Ministre de l'Agriculture*, the publications of the *Conseil National Economique*, and regional monographs by French writers.

Chapter IV

FISHERIES

Introduction: The Eastern English Channel: Normandy and North Brittany: South Brittany: The Bay of Biscay (south of the Loire): The Mediterranean Coast: Organization and Research: Bibliographical Note

INTRODUCTION

In view of the extensive coastline of France, it is not surprising that the French fishing industry employed in 1937 nearly 70,000 registered boat fishermen (*en bateau*), and about 50,000 part-time shore fishermen. Another 9,000 people were also employed in the preservation of fish and in associated activities; two-thirds of these were women.* Although the fishermen were distributed widely round the coasts, the table on p. 155 shows that the majority lived on the Atlantic coast south of Brest, and that three ports, namely, Concarneau, Lorient and Boulogne, had together nearly one-quarter of the fishermen of France.

The total catch, other than shell-fish, in 1937 was 352,000 metric tons, which compares unfavourably with that of other European countries, as the following table shows:

	1,000 metric tons		1,000 metric tons
Great Britain	1,108	Holland	263
Norway	1,012	Denmark	88
Germany	671	Finland	22
Iceland	322		

Two-thirds of the total French catch by weight is made up of five species of fish—cod, herring, sardine, mackerel and tunny; yet 'other products', including finer varieties and shell-fish, form half to three-quarters of the total value, as the following table shows:

	Million francs	
	Total value of all fish	Value of 'other products'
1932	958	663
1933	927	597
1934	893	544
1935	761	516
1936	892	720
1937	1,142	674

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* These figures refer to mainland France. Corresponding figures for Corsica and North Africa are included separately in the table on p. 155. It is not possible, however, to isolate the figures of Corsica and North Africa in the tables of total values and weights of individual fish on p. 156.

The proportion of the value of 'other products' was lower in 1937 than for many years, because of the unusually heavy catches of cod, herring and sardines (Fig. 60). This total of 1,142 million francs (to which Corsica and North Africa contributed 88 million francs) was just under one-third the value yielded by the coal mines of France, but it was only one-fiftieth the value of French agricultural produce. The corresponding British fishery figures for 1936 were approximately one-tenth for coal mines and one-twelfth for agriculture.

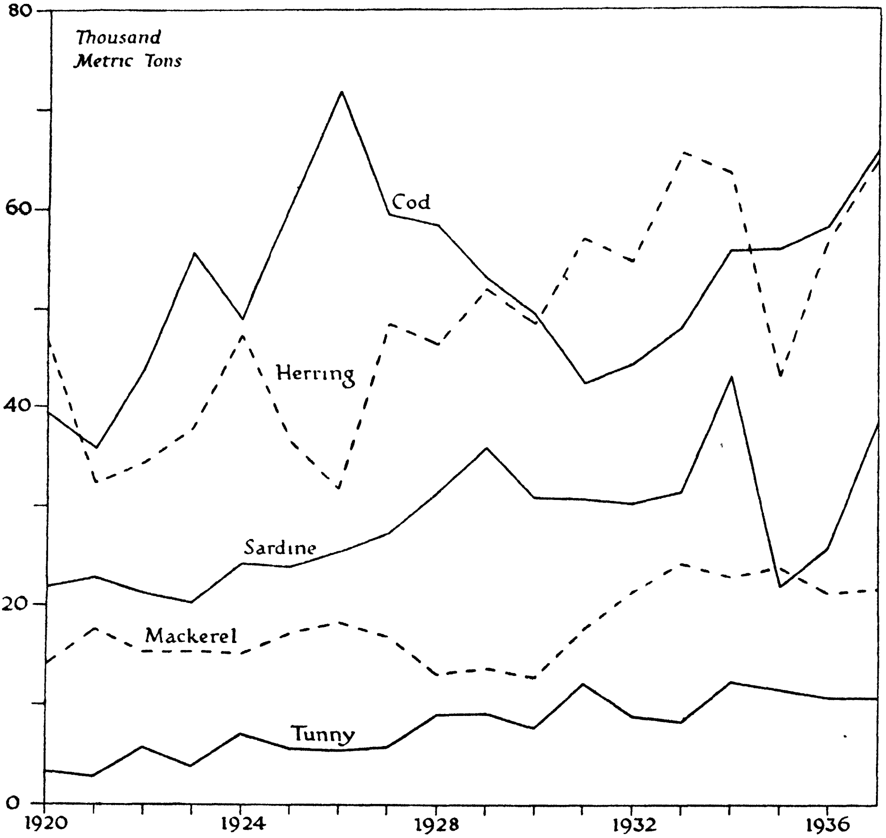

Fig. 60. Annual French catch of cod, herring, sardine, mackerel and tunny, 1920–37

From *Annuaire Statistique, 1938* (Paris, 1939).

'Wet fish', as distinct from 'shell-fish', fall into two main classes—pelagic and demersal. The former live in surface waters or at no great depth, and occur in large shoals in the relatively shallow seas on the continental shelf. The more important of these in the French fisheries are the herring, sardine, mackerel and tunny, and the quantities

Table of fishery statistics, 1937

Port	No. of fishermen *en bateau*	Fishing boats				Weight (metric tons) of fresh fish	Value (1,000 francs) of all fish products
		No.	Total tonnage (metric)	No. mechanized	Mechanized tonnage		
Dunkirk	809	172	2,888	171	2,886	4,013	18,135
Calais	205	29	531	24	516	1,021	2,450
Boulogne	4,367	420	35,121	238	5,642	86,712	187,529
Dieppe	1,132	161	7,605	117	2,538	20,315	52,603
Fécamp	1,500	170	17,037	108	3,042	10,640	71,301
Havre	449	226	1,623	185	705	634	4,142
Caen	1,085	460	3,735	284	3,318	5,339	15,088
Cherbourg	1,272	614	2,775	180	1,245	4,323	18,269
Cancale	368	224	729	121	410	260	1,803
St Malo	1,883	237	19,135	61	268	156	41,806
St Brieuc	535	218	639	101	437	294	1,782
Paimpol	415	272	1,096	86	523	197	1,933
Tréguier	336	151	378	26	62	84	968
Lannion	522	288	762	90	329	338	2,565
Morlaix	1,204	604	1,720	221	920	4,767	5,559
Brest	2,734	1,027	4,075	185	2,069	1,066	14,875
Camaret	1,977	375	5,603	112	1,659	980	14,620
Douarnenez	3,467	500	8,867	426	7,763	10,825	33,351
Audierne	3,361	504	3,861	249	2,404	2,555	15,113
Guilvinec	3,510	829	4,844	545	3,836	5,836	20,388
Concarneau	5,625	1,034	11,657	264	2,939	7,611	36,382
Lorient	5,297	954	31,323	249	5,011	32,821	86,503
Auray	2,779	903	10,240	225	1,599	6,282	27,379
Vannes	816	512	1,866	78	355	49	1,981
St Nazaire	1,416	436	2,195	321	1,733	9,132	31,595
Nantes	350	228	531	115	378	230	2,627
Les Sables d'Olonne	3,975	1,246	12,647	477	4,409	8,469	36,222
La Rochelle	2,596	767	18,008	323	5,231	17,381	90,950
Rochefort	203	129	435	79	309	85	2,669
Oleron	490	165	708	139	660	366	1,827
Marennes	1,610	1,065	3,331	659	2,714	211	5,435
Bordeaux	966	471	10,191	325	7,928	412	66,394
Arcachon	2,077	1,154	7,981	689	2,333	8,939	38,785
Bayonne	1,854	563	3,006	132	486	7,215	27,071
Port-Vendres	1,187	581	1,249	214	736	1,909	10,008
Sète	2,126	1,375	3,594	646	2,477	2,350	18,439
Martigues	570	468	889	278	603	426	5,454
Marseilles	1,696	732	1,854	623	1,438	4,138	27,177
Toulon	1,366	837	1,471	613	1,218	1,059	8,635
Nice	966	570	1,094	275	644	495	4,352
Summary							
North Sea and Channel	17,729	4,965	98,193	2,122	23,443	156,560	437,199
Atlantic Ocean	43,325	12,133	139,051	5,483	52,154	119,741	542,939
Mediterranean Sea	8,011	4,573	10,151	2,649	7,116	10,376	74,065
Total (mainland)	69,065	21,671	247,395	10,254	82,713	286,677	1,054,203
North Africa	3,884	1,150	4,770	866	3,121	23,952	81,262
Corsica	1,040	380	550	253	413	809	7,197

The source of this and of other tables in this chapter was *Statistique Annuelle des Pêches Maritimes, 1937* (Paris, 1938).

caught vary tremendously from year to year (Fig. 60). In 1937, the amounts of each were as follows:

	Weight metric tons	Value million francs
Herring	64,682	88
Sardine	38,310	125
Mackerel	21,299	62
Tunny	10,658	54
Anchovy	7,547	10
Sprat	2,742	3

Demersal fish live normally at the bottom of the sea; this category includes both flat fish, such as plaice and sole, and free-swimming varieties, notably cod and whiting. Cod is the most important, both by weight and value, but a great variety of other demersal fish is caught. In 1937, the following quantities were landed:

	Weight metric tons	Value million francs
Cod (excluding oil)	65,512	154
Whiting	26,843	71
Skate and ray	14,068	37
Plaice	7,935	29
Sole	1,577	28
Congers	2,846	11
Turbot	1,203	11
Mullet and bass	1,139	11
Eels	1,025	4
Brill	417	4

In addition to these two main categories, the French official returns also include a total of 65,144 metric tons (valued at 200 million francs) of 'other fish', that is, of unclassified *poisson frais*, which are sold unsorted in bulk. Shell-fish, which are hardly comparable by weight, were valued in 1937 at 147 million francs; lobsters comprised 38 million francs, oysters 26 million francs, and shrimps 18 million francs. They formed one-tenth of the total value of French fisheries; the corresponding figure for Britain is only one-thirtieth. To these figures must be added large but unspecified amounts of fish which do not appear in official returns. In the first place, these take account only of fish sold in market, and the amounts consumed by the fishing population itself must be considerable. In the second place, inland and fresh-water fisheries (rivers, lakes and artificial pools) provide an important source of food in country districts.

During the last forty years the French fishing industry has experienced, but to a much less extent, the same centralization and industrialization, which has concentrated the British fishing industry at six main ports. Half the total French catch is landed at four ports—Boulogne, Lorient, Dieppe and La Rochelle (Fig. 61). The first of these is pre-eminent; over a quarter of French fish are landed there, but even so it handles less than one-third of the annual total of Hull. If the value of fish is considered instead of its weight, Boulogne is still outstanding but less strikingly so, as it is responsible for about one-sixth of the total value.

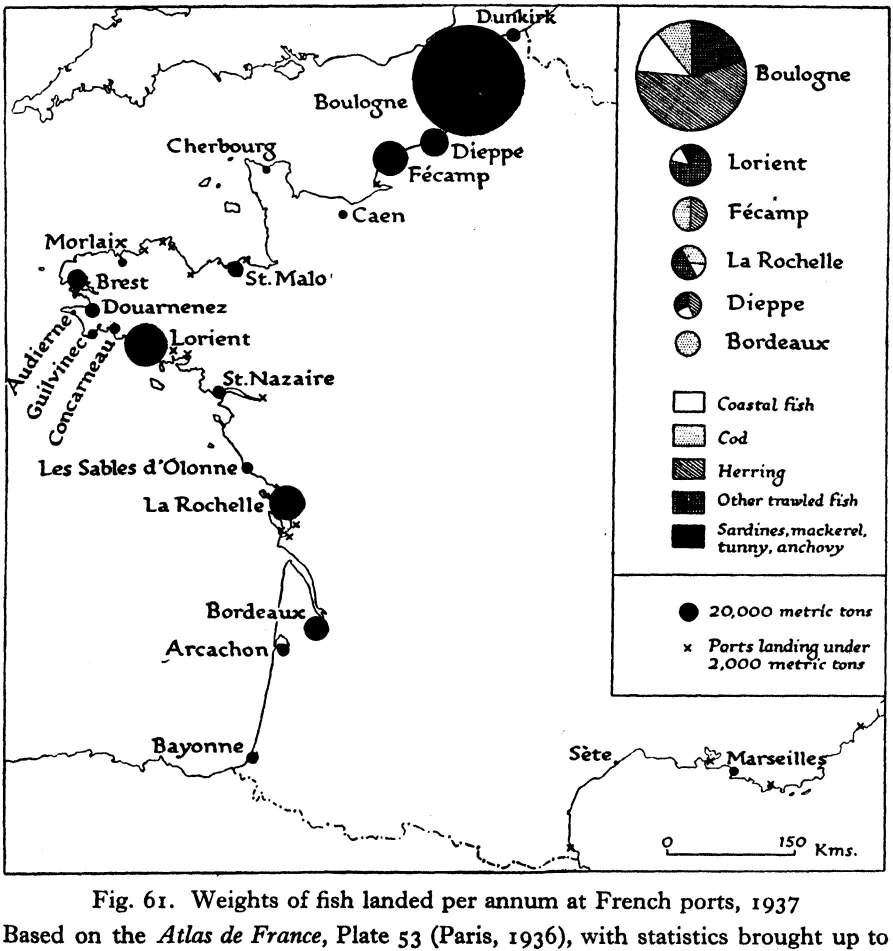

Fig. 61. Weights of fish landed per annum at French ports, 1937
Based on the *Atlas de France*, Plate 53 (Paris, 1936), with statistics brought up to date from *Statistique Annuelle des Pêches Maritimes, 1937* (Paris, 1938).

In 1937, there were more than 23,000 fishing craft registered along the French coast, including about 1,500 in Corsica and North Africa. Of this total, only 401 were steam-driven, 11,373 were mechanically driven by Diesel or by auxiliary motors, and 9,711 were sailing boats. The first category, however, amounted to over 92,000 metric tons, or more than one-third of the total fishing tonnage. It is significant to compare (p. 155) the number of vessels and their total tonnage at Boulogne, Lorient and Fécamp, where most of the large steam trawlers have their base, with ports like Sète, Les Sables d'Olonne or Arcachon. Sète, for example, has more than three times as many craft as Boulogne, but the tonnage of the latter is ten times as great.

The French fishing centres may be conveniently grouped in five areas, as follows:

(1) The Eastern English Channel.
(2) Normandy and North Brittany.
(3) South Brittany.
(4) The Bay of Biscay (south of the Loire).
(5) The Mediterranean Sea.

In each stretch of coast the fisheries will first be described, then the important fishing ports.

THE EASTERN ENGLISH CHANNEL

This area is characterized more than any other part of the French coast by the centralization and commercialization of the fishing industry. There are few little villages, such as are typical of Brittany, whose populations earn their livelihood by small-scale and often part-time fishing. Instead, there is a small number of fishing ports able to provide accommodation and fuel facilities for the large mechanized vessels. More than one-third of the total French catch is landed at these ports.

Herring. The entire French catch of herrings, about one-tenth of the European total, is landed along this coast. Herring fishing starts in May in waters to the east of the Shetlands; it has migrated to the seas off Flamborough Head by October, and reaches the Straits of Dover and the Channel in November. Formerly, the typical vessel was the *dundee*, a strongly built sailing boat of from 10 to 60 metric tons, but there is an increasing number of steam or Diesel drifters. These drifters are some 40 m. long, are of about 300 metric tons, and carry a crew of from six to eight. The herring are caught at night by series of drift nets (*raies*), each 50–60 m. long, which form an extended wall of netting kept vertical in the water by buoys and weights, and fastened by a series of ropes to a headline which is attached to the drifting ship. A large amount of herring is caught by trawling in the day time, that is, by dragging along the sea bottom a bag-shaped net kept open by a beam or by wooden trawl boards (*chalut à panneaux*). This takes place off the Shetlands

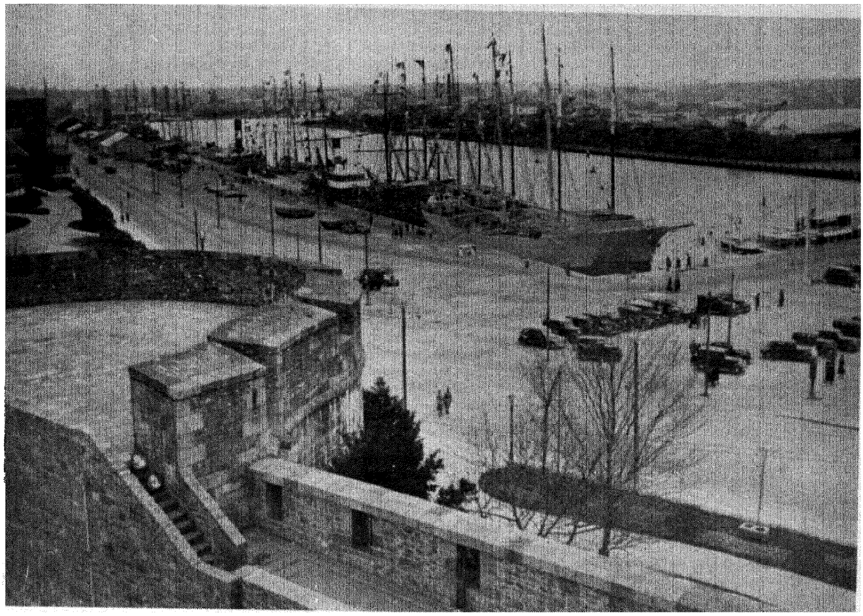

Plate 39. *Terreneuviers* at St Malo

St Malo is the home base for the *terreneuviers*, which fish for cod off the Grand Banks of Newfoundland. The vessels in the Bassin Duguay-Trouin are decorated with bunting for a religious ceremony before they leave in March for St Pierre and Miquelon.

Plate 40. Fish preserving at Concarneau

Large numbers of women are employed on a part-time basis in the numerous sardine and tunny preserving factories of the town.

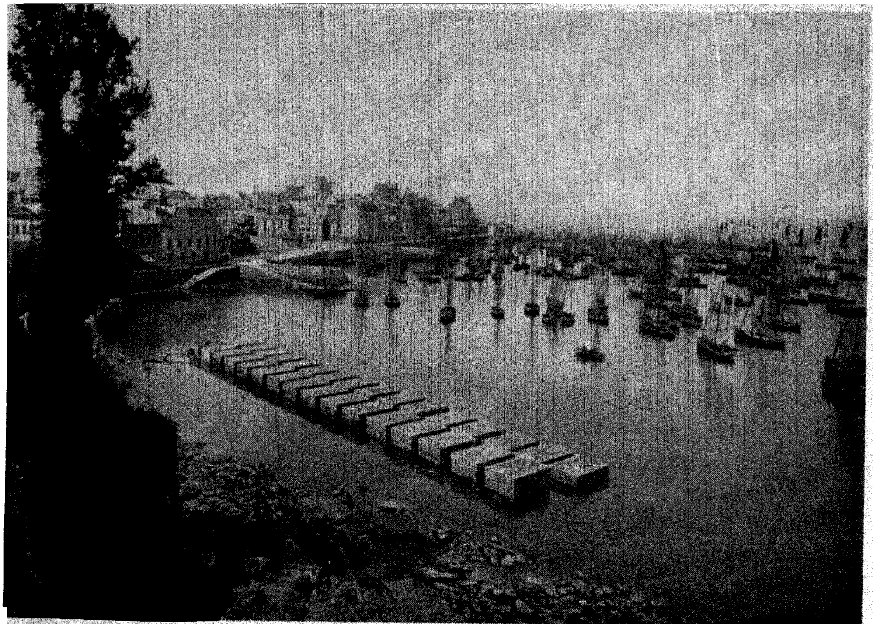

Plate 41. The sardine fleet at Douarnenez

This view shows part of the large flotilla of *bâteaux sardiniers* in the Grand Port. The fine meshed nets with their cork floats are hung from the masts to dry.

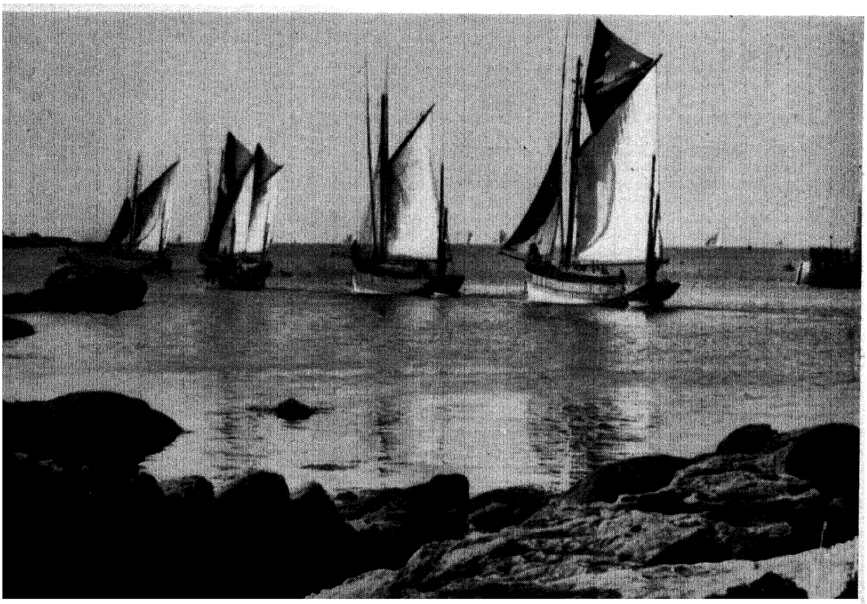

Plate 42. Tunny boats at Concarneau

The usual tunny boat is a strongly built *dundee* of some 40–60 tons; a notable feature is the *tangon* or rod, fastened to the base of the mast, to which the lines and hooks are attached.

from December to May, off Aberdeen from May to October, and in the seas off the north of Ireland and in St George's Channel from July to September (Fig. 62). It is a harmful (although lucrative) practice, as it spoils the grounds for other varieties of fish.

Mackerel. Many of the herring drifters are used at appropriate times of year for the mackerel fishing. The mackerel are caught in March off the south coast of Ireland, and the season ends in June off the Scillies. Thus the drifters are laid up only from January to March, and sailors sign under a single contract for about nine months.

Cod. Fécamp and Boulogne are the two chief centres for the cod fisheries or *grande pêche.* These lie in distant waters off Iceland, Greenland and Newfoundland, and more recently in the Barents Sea. The amount of cod produced in 1937 was as follows:

Ground	Fish metric tons	Oil hectolitres
Iceland and north European waters	11,678	1,742
Greenland	15,280	5,390
Newfoundland	38,554	9,017

French fisheries in Icelandic waters were once very extensive, and vessels sailed not only from Gravelines but from Paimpol and St Malo on the Breton coast. In 1900, over 250 sailing boats, including both *dundees* and *goélettes* (a type of schooner), fished these waters, but in 1932 there were only twenty-one, including nine from Gravelines. These vessels left France about the middle of February, and reached Iceland in about 10 days. The *dundees* fished the east coast of Iceland from March to August, moving gradually north, while the schooners similarly worked northward round the west coast. The decline in the French Icelandic fisheries coincided with the disappearance of these sailing vessels, which were unable to compete with British and Norwegian steam trawlers. In 1931, only about 3,000 tons of Icelandic cod were caught.

Since that year there has been a revival, owing to the increase in the number of French steam trawlers built at Havre or in some cases at British dockyards. They are owned by companies such as *La Morue française* or *Pêcheries de France.* Stationed at Fécamp and Boulogne, these vessels are from 550 to 1,350 gross tonnage, have a bunker capacity of 250 tons, and a storage space of about 750 cu.m. They leave port at the beginning of February, fish to the south and west of Iceland, and return in April and May either to France or to Reykjavík. In the latter case the catch is transferred to a carrier ship, and the trawlers, after revictualling and refuelling, proceed to the Grand

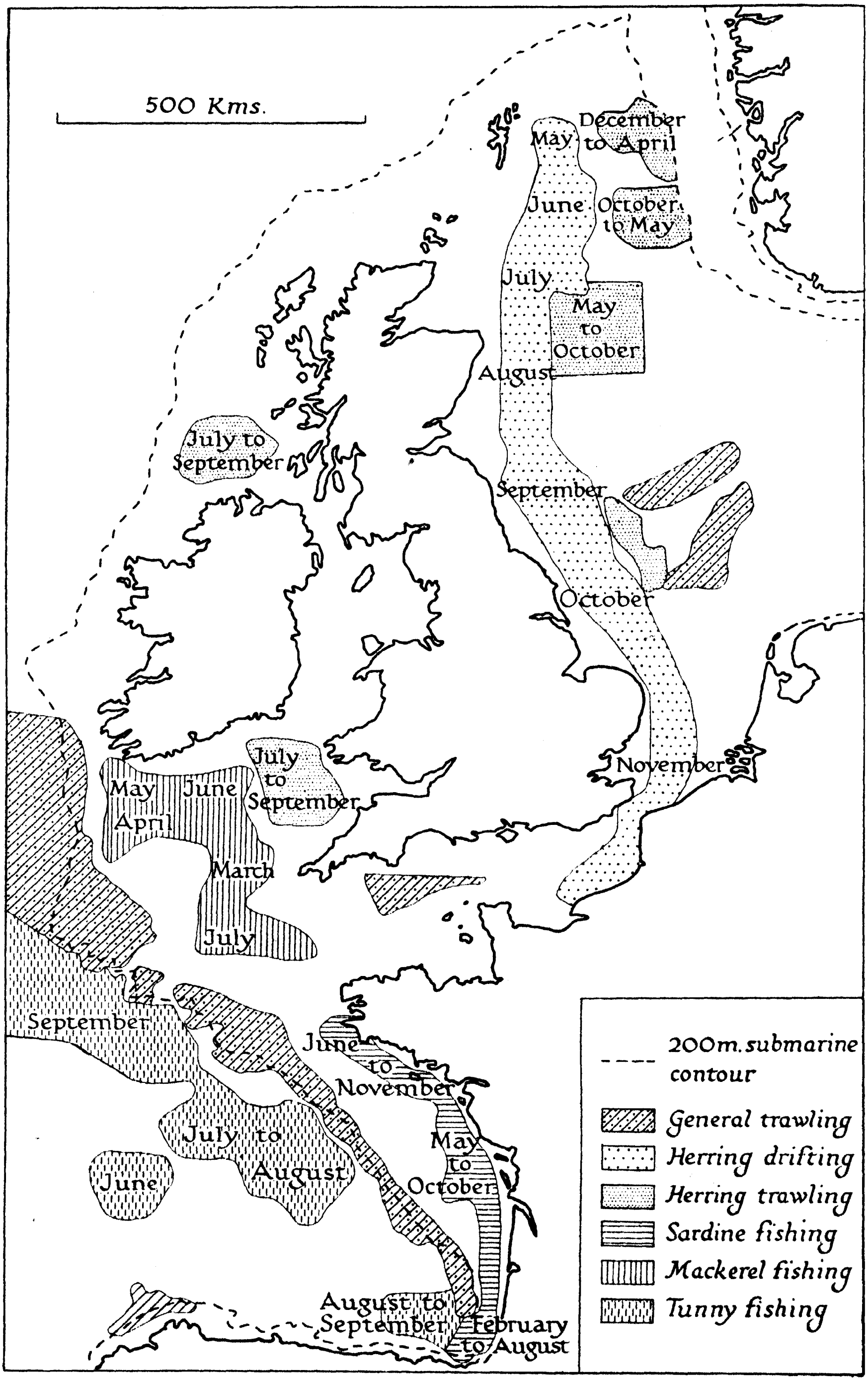

Fig. 62. French fishing grounds off western Europe
Based on the *Atlas de France*, Plate 53 (Paris, 1936).

Banks of Newfoundland or to the west coast of Greenland for a second season.

At these fishing grounds they join the small fleet of vessels, including sailing craft such as *terreneuviers* or *troismats*, stationed at St Pierre and Miquelon, which are the last remnants of the former American colonial empire of France. The French were the pioneers of the Newfoundland fisheries, and in the seventeenth and eighteenth centuries supplied vast quantities of salt and dried cod to Catholic Europe. Certain fishing rights enjoyed after the Treaty of Utrecht in 1713 were renounced under a convention concluded with Britain in 1904. They are now allowed to fish the banks off the coasts of Newfoundland from Cape St John on the east coast round to Cape Ray in the south-west.

Each vessel carries twelve or more little row-boats or *doris* which leave at dawn with two men. Series of lines each with several hundred baited hooks are laid and marked by buoys; the *doris* then return to the ship and the crews spend the day cleaning and salting the previous day's catch. The livers of the fish are usually packed in barrels, but on the most modern vessels the liver oil is extracted on board; the roes are salted, and the offal is converted into fish manure. In the evening, the *doris* go out again to collect the catch.

Miscellaneous fish. A large amount of miscellaneous fish, known as *poisson frais*, is landed at ports along this coast by small and medium-size trawlers, which put out for six or seven days to fishing grounds in the English Channel, St George's Channel, and the seas south of Ireland. There is no specialization; the boats not only bring in turbot, brill, sole, skate, etc., but also take part in the mackerel or herring fisheries. This provides regular employment throughout the year, although the returns are tied up with fluctuations in demand; a good haul in Lent, for example, will produce higher profits than at other times of the year.

Boulogne (Plate 38) is easily the biggest fishing port in France, both for the weight and value of catch, and also for the total tonnage of its boats (see p. 155). Six docks serve the fishing fleet, but the port facilities are insufficient and expansion of quay space is virtually impossible.* In recent years there have been improvements in facilities for curing, salting, and packing, and fast night trains of refrigerator cars provide a good service with the Paris markets. Over 5,000 people, or about one-tenth of the population of the town, find occupation in the activities associated with fish curing, etc.

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* Details of the facilities (docks, quays, sidings, etc.) at the larger ports mentioned in this chapter are given in chapters I, II and III of volume IV of this Handbook.

Dieppe. Although Dieppe handles only about a quarter of the tonnage of Boulogne, it is an important port for the smaller trawlers which fish for *poisson frais*, returning daily to supply the markets. These boats use the outer port (apart from the packet quay) and the Bassin Duquesne. A large covered fish market, with modern equipment and adjacent railway sidings, has been built on the Ile de Pollet, near the outer port, and less than four hours elapse between the docking of the fishing boats and the loading of washed fish into refrigerator cars. Sometimes as much as 200 metric tons of fish arrives in the harbour between 1500 and 2100 hours and leaves before midnight for Paris, either in one of the seven daily fish trains or in refrigerator vans coupled on to a Paris boat train.

Fécamp. Geographical conditions are against the development of Fécamp, as the port is naturally poor, and the lines of communication with Paris are unsatisfactory. Yet it is the fourth fishing port of France in value of catch, because it is the chief centre for the fitting out of the big Newfoundland trawlers, and it has the largest single dried cod market in the country. It takes part also in the mackerel and herring industries.

Gravelines has long since lost the importance of days when it shared, with Paimpol, the Icelandic fishing industry. It now has only a few small boats which fish near the coasts.

NORMANDY AND NORTH BRITTANY

While the northern and southern coasts of Brittany are physiographically very similar, there are considerable differences in their respective fishing industries. On the north coast, fishing is represented by the remnants of a once flourishing deep-sea industry, together with part-time coastal fishing that ekes out the meagre resources of the land. On the south coast there are important sardine and tunny fishing centres. In many of the innumerable tidal creeks along both coasts is a little fishing village, and almost all the population gain a large part of their living from the sea. As a result, Brittany has long been the main recruiting centre for the French navy. Nearly one-half of the personnel of the navy are of Breton origin—some 27,000 out of 59,000 in 1935; and about 23,000 out of the 65,000 of the French mercantile marine are also Breton. Some 42,000, or over a half, of the French fishermen are Breton, and of these about 38,000 live and work in Brittany itself. The rest have migrated to the big trawler ports of Boulogne, Fécamp, etc. In 1933, there were over 8,000 unemployed deep-sea fishermen in the three centres of St Malo, St Servan and Cancale. Large sailing boats decreased to about a quarter of their number before the war of 1914–18, and, moreover, steam trawlers require fewer hands.

Coastal fishing. Along the north coast are numerous small fishing villages, whose population engage in coastal fishing for herring, mackerel, conger, skate, turbot, mullet and crustaceans. Sailing boats, with a multiplicity of types and rigs long adapted to the needs of a locality, are used. Paimpol, for example, had 272 registered boats in 1937 averaging about 9 metric tons, owned by 272 *patron-propriétaires*; only ninety boats were mechanically propelled. This coastal fishing employs part-time men who also own little farms, and is scattered and unorganized. The collection of shrimps and shell-fish is carried on at low tide by women and children.

Lobsters and oysters have greater commercial importance than the miscellaneous coastal fishing, as they are sent in fluctuating quantities to Billingsgate. But with two exceptions, the industry is in no way comparable with the large-scale enterprises of south Brittany and the Biscay coast. These exceptions are the cultivation of oysters in the Bay of Cancale and at Tréguier, and the lobster tanks at Roscoff, where crustaceans caught along the Portuguese and Moroccan coasts are stored.

Seaweed. An associated industry of some interest is the collection of seaweed in the mud-filled inlets. Regulated by ancient custom, the *goémon* and *varech* is cut in spring by men in barges, and is sold to farmers for use as fertilizers, or sent to iodine factories.

St Malo (Plate 39). One exception to this small-scale local fishing is at St Malo, although this port is by no means as important as it was in sailing-ship days. With some 19,000 metric tons of shipping, it is the third fishing port of France, and sends trawlers to Newfoundland waters. About one-quarter of the dried cod landed in France in 1937 came into St Malo.

SOUTH BRITTANY

The water of the Bay of Biscay is considerably warmer than that of the Channel, and so the chief fish landed in south Brittany are sardines and tunny.

Sardines. The French catch of sardines is only exceeded in value by that of cod. The industry developed between 1870 and 1900 at the numerous small ports along the south coast of Brittany. Fishing is seasonal; it generally starts in February in the Gulf of Gascony and works north to end off Finistère in November, but it is most active in summer. The sailing boats are of 7 to 8 metric tons and have a complement of from seven to twelve men. They leave port after sunset, and begin fishing at sunrise, either directly from the boats, or from small *carots* (dinghies) taken by the larger vessels. The fine-meshed drift-nets (*battude*), about 30 × 9 m., are baited with a mixture of cod roe and pea-nut flour, and are allowed to float vertically in the water. As soon as a haul of about 5,000–6,000 fish has been made, the vessels hurry back to port, where the catch is immediately sold to the factories. The fish are rapidly cleaned and sorted by women, and are then dried and dipped into hot oil. After drying again, they are packed in tins. It is interesting to note that the price of sardines depends not on the fish but on the quality of the oil, the best varieties being preserved in pure olive oil, the cheaper in cotton-seed oil.

Tunny. Fishing for the white tunny (*germon*) is concentrated into a short intense season of some 100 days from the beginning of July to the middle of October. As a result, the fishermen have to find winter employment on Boulogne trawlers, or in coastal fishing, or they may even sign for a short voyage on a merchant ship. The industry began at La Rochelle and Les Sables d'Olonne south of the Loire about 1885, but now some 95 % of the catch is landed at Concarneau, Douarnenez, Groix, Port-Louis and Etel, where the chief factories are situated. The tunny boats of the south Breton coast number about 700, and they are mostly *dundees* of some 40–60 metric tons. In recent years, however, a larger motorized semi-trawler type has been introduced which can be used for winter fishing. The boats, each with a crew of six or seven, are away from 10 to 15 days at a time, and make from six to eight voyages in a season. Long rods or *tangons*, which can be raised or lowered, are fixed to the base of the mast; each rod has six or seven strong hemp lines and hooks baited with horse hair, maize straw, etc. Fishing is best done on a grey day with nearly calm seas, and the boat sails at about 6 knots with the bait leaping about on the surface. When a fish is hooked, it is hauled aboard, killed, cleaned and hung up by the head on trestles. The boats return at intervals to the port, where the fish is auctioned before unloading, and then delivered to the factories along the quays. The whole catch is preserved, and 172 canning factories are found along this coast, out of a French total of 207. Some of these factories, however, handle both tunny and sardines. The work is done chiefly by women, who work very irregularly, and are paid by the hour. At Concarneau, for example, 2,000 women are employed on a temporary basis (Plate 40). The tunny is largely sent to Latin America, Brazil, Belgium, central Europe and Greece.

Miscellaneous fish. Sardines and tunny are the two staple fish, but they are by no means the only ones. From most of the small ports, *dundees* take part in coastal fishing; they sail out each day for a few kilometres from the coast and fish for about 12 hr. From the larger ports, notably Lorient, motorized vessels carry on a variety of fishing. The bigger trawlers of several hundred tons steam out as far as the Grand Sole Bank to the south-west of Ireland, chiefly for hake, skate and eels. Smaller trawlers confine themselves to distances within 25 km. for sole, gurnard, turbot, etc. Mackerel and whiting are fished by line from small boats, or by nets from larger drifters.

Crustaceans and Shell-fish. Lobsters are caught along the south Breton coast, either by *casiers* (wicker pots baited with dog-fish), or by large-meshed nets 100 m. long which are dragged along the bottom in water 50 m. deep. The *langouste*, or spiny lobsters, are fished on the coasts of Portugal, Morocco and Mauretania, and the lobster fishers are often away as long as three months. After a successful trip, a boat may return with 7 or 8 kg. of live lobsters. The catch is stored on shore in masonry tanks at Concarneau, Audierne, Manèmeur, Port-Haliguen, etc. Oysters are cultivated in the silted ria of Etel at Auray, at La Trinité near Carnac, and at Carnac itself.

On the south, as on the north coast of Brittany, there are a large number of small ports and sheltered anchorages, each with some hundreds of craft. Apart from Lorient, the two largest fishing ports in the south are Douarnenez and Concarneau, while the naval port of Brest accommodates over a thousand small fishing vessels.

Douarnenez (Plate 41) is notable in that, in 1937, 426 of its 500 boats were mechanized. The port is sheltered by the natural breakwaters of the Pointe du Leide and Ile Tristan, and consists of three parts: on the west is the small fishing port of Treboul almost enclosed by Ile Tristan, on the ria estuary of Pouldavid is the commercial harbour of Port-Rhu; which supplies the fishing fleet with coal, wine, bait, food, salt, etc.; while the real fishing harbour is in the extremely busy Grand-Port, with its sardine factories and railway sidings. Douarnenez is probably the most prosperous fishing port in France, as it has three distinct fishing flotillas—250 sardine boats, eighty large tunny boats and thirty lobster boats, and in addition to these some hundreds of boats are engaged in the coastal fisheries. There are twenty-four fish-preserving factories, most of them with modern equipment; women supply the labour, which is specialized and well paid, but intermittent.

Concarneau (Plate 42). This provides a safe anchorage that can accommodate over 1,000 vessels. It also has twenty-four fish-preserving factories.

Lorient is very different from its neighbours; a modern port has been constructed to handle a large amount of fish. Until 1927, the *avant-port* was used by the fishing boats, but between 1920 and 1927 two docks for fishing boats were built by the state. These are the *Grande Bassin* and the *Bassin Long*, and now form the new fish port of Kéroman. Dock gates are not necessary, and boats can get in and out at all tides. Colliers are able to berth on the outside of the quays, and adequate coal-storage accommodation with transporter belts enable twenty large trawlers a day to be refuelled. The prompt despatch of fish to market is facilitated by railway sidings and by services of express refrigerator cars. As a result, Lorient has become the second fishing port of France by weight of fish landed, although it is only third by value. Its boats take part in the tunny and sardine fisheries in the Bay of Biscay, in the mackerel and herring fisheries, and in the more distant deep-sea fisheries.

THE BAY OF BISCAY (SOUTH OF THE LOIRE)

The Biscay coast south of the Loire does not offer many natural harbours, and as a result sardine and tunny fishing is on a small scale and is distributed among numerous small villages along the coast.

Oysters. Ideal breeding grounds for oysters are provided by the lagoon coast of the Landes, by the Bassin d'Arcachon (Plate 44), and by the muddy estuaries between Marennes and Les Sables d'Olonne which are sheltered from the westerly gales by the islands of Oleron and Ré. Along this coast the Portuguese oyster has largely superseded the European or plate oyster that is cultivated on the English coasts, although the latter has recently increased again in numbers, as shown by the following figures:

Millions of Oysters

	1911	1920	1926	1937
Portuguese oyster	790	378	1,084	1,230
European oyster	922	463	11	223

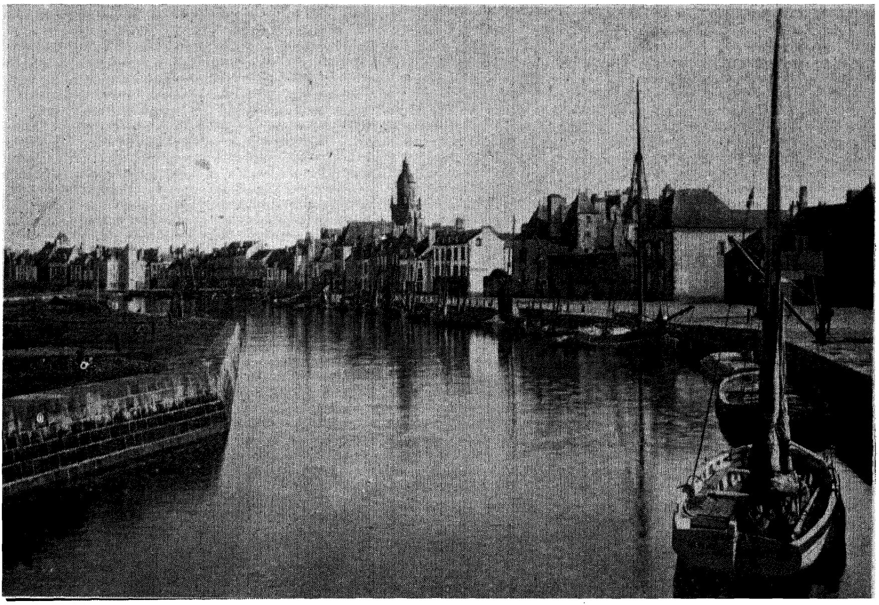

Plate 43. Le Croisic (Loire-Inférieure)

Le Croisic is typical of the numerous small fishing ports scattered along the coast. The harbour is situated on the southern shore of the Grand Trait, a large shallow bay.

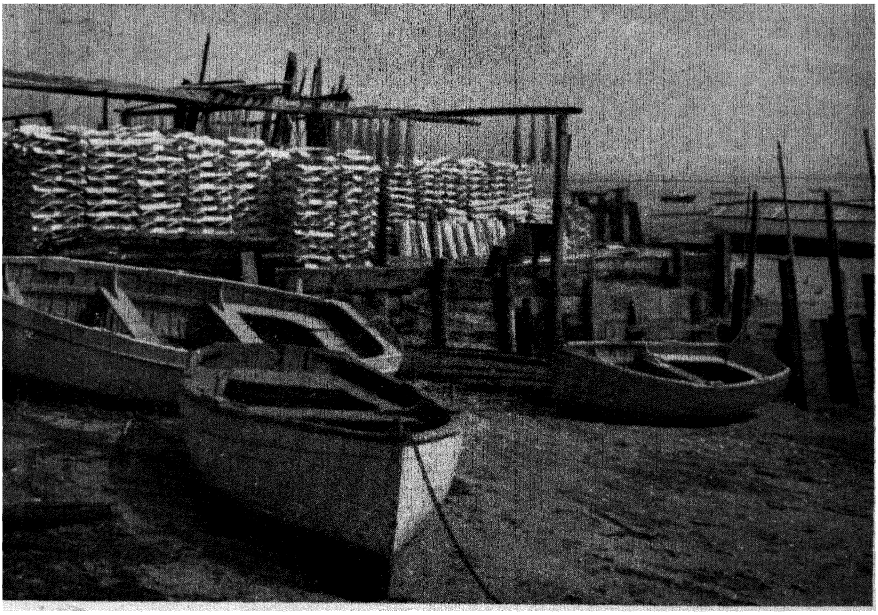

Plate 44. Oyster pans at Arcachon

The young oysters are placed in these earthenware pans, which are sunk in the shallow lagoon (the Bassin d'Arcachon). It is thus easy to collect the oysters when they attain maturity.

Plate 45. The fishing port at Martigues

Along the Mediterranean coast of France are numerous small ports, sheltering little craft which fish the *étangs* and canals. This example is the St Sebastian Canal at Martigues, a cul-de-sac used by fishing boats.

Plate 46. The fishing port at Marseilles

A large number of small fishing boats use the old harbour at the southern end of the port.

The oysters are collected from November to 1 May, and other fishing boats are often laid up during this time because oyster dredging is more profitable. The catch is made for 2 hr. before and after low tide, both men and women taking part, usually in punts. The oysters are cut off from the rocks upon which they grow in large clusters, or are dredged from shallow water. The small ones are sent to the culture beds (*parquers*) at Arcachon, Marennes, Oleron, etc., and the large ones are packed in barrels to send to the Paris market.

Three ports, Les Sables d'Olonne, Marennes, and Arcachon, have over 1,000 registered boats; but most of these are small, and include many oyster punts. *La Rochelle* is the second French fish port by value and fourth by weight of catch. The outer basin of La Rochelle has a fish quay 400 m. long used by a fleet of eighty large steam trawlers, while the smaller fishing boats use the stranding basin. Alongside the fish quay are extensive fish sheds and railway sidings. The neighbouring port of La Pallice accommodates twelve of the largest trawlers, which go to the Newfoundland and south-west Greenland Banks. Smaller trawlers fish for hake, mackerel, herring, etc., while there are extensive coastal fisheries with Diesel and petrol-driven boats, catching turbot, sole, tunny, crab and lobster.

Bordeaux owed much in earlier days to the import of dried cod, and although a large amount (valued at 66 million francs in 1937) is still landed, the item is relatively of small account among the multifarious activities of the great colonial port. There are no special fish docks.

THE MEDITERRANEAN COAST

The fisheries of this coast are much less important than those of the rest of France, but over 9,000 men obtained employment in 1937.

Miscellaneous fishing. The Rhône delta has a large number of little fishing villages. Red tunny, sardines, anchovies, *poisson bleu*, mackerel and skate are caught in the open sea, and a variety of less well-known fish are caught in the lagoons and waterways. The red tunny, much bigger than its Atlantic relative, appears in shoals at the beginning of summer off the coasts of Sicily, Sardinia and southern France. Only 1,800 metric tons of these fish, about a fifth of the total of white tunny, were landed in 1937. It is caught by *madragues*, enormous wide-meshed vertical nets up to 300 m. long, or by *seinches*, a series of nets laid by a number of vessels round and below a shoal, or by harpoons. The oyster beds at Thau, nearly wiped out by too thorough dragging in 1907, are carefully conserved.

Some of the fishing methods on this coast are very different from those in other parts of France. The Sète fishers have long boats coupled in pairs (*bateaux boeufs*) behind which they drag a long net with wide wings, an effective method of catching such pelagic fish as sardines and anchovies. Single Catalan boats, or *palavas*, lay drift nets in summer in the open sea, while at all seasons the individual fisherman and his family work in the *étangs*, catching fish by harpoon or by series of complicated fixed nets (*esturiés*, *triangles*, and *trabaques*). Nomadic fishermen camp in summer on the coast between Sète and Agde for the special seasonal fishing. People from towns outside the delta, and even from Italy, come every summer to Thau for the shell-fisheries, working until they leave for the wine harvest in Languedoc and the Rhône Valley.

The two most notable of the Mediterranean ports of France are Marseilles and Toulon. There is no special provision, however, for the fishing industry at *Marseilles*, and only about 4,000 tons of fish were landed in 1937—a very small part of the trade of that great port. The 700 registered fishing vessels are mainly small craft of about 2 tons which share the Outer Port with pleasure craft (Plate 46). Although *Toulon* has over 800 small craft, it landed barely 1,000 tons in 1937. *Sète*, situated to the west of the Rhône delta, has more boats than any other fishing port in France, but they average less than 3 metric tons each.

ORGANIZATION AND RESEARCH

The government department responsible for the administration of the fishing industry, for the registration of boats, fishermen and catch, and for the compilation and publication of statistics, is the *Ministre de la Marine Marchande*. Scientific aspects of the industry are controlled by the *Office Scientifique et Téchnique des Pêches Maritimes*. Powerful local organizations, such as the *Société du Port de Pêche de Lorient*, superintend to a large extent the activities at the various ports.

Research is carried on at over twenty marine biological stations round the coast. The *Office Scientifique* maintains a laboratory at Paris and at St Servan, a large *Laboratoire de Biologie appliquée à la Pêche* at La Rochelle, and numerous smaller stations at many of the ports. Special interest is taken in oyster culture; the *Office Scientifique* maintains the *Inspection Générale du Contrôle Sanitaire Ostreicole* at

Paris, and there are research stations at Auray, La Rochelle, La Tremblade and Arcachon. Other marine biological laboratories are maintained by (1) the *Ministère de l'Education Nationale* at Wimereux, Luc-sur-Mer, Dinard, Biarritz, etc., (2) by the universities, notably the one maintained by the Sorbonne at Roscoff, and (3) by various public and private societies and institutions. An example of the last is the famous *Institut Océanographique*, maintained by the Principality of Monaco. France assists international fishery research through her membership of the *Conseil Permanent International pour l'exploration de la Mer* at Charlottenlund in Denmark.

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(1) Detailed statistics are given in the annual official publication, *Statistique Annuelle des Pêches Maritimes*, edited and published by the 'Ministre de la Marine Marchande' (Paris). Summary and retrospective tables are given in the *Statistique Annuaire* (Paris). Summaries are also conveniently given in the *Bulletin Statistique des Pêches Maritimes des pays du nord et de l'ouest de l'Europe* (Copenhagen), published annually by 'Le Conseil Permanent International pour l'exploration de la Mer'.

(2) The 'Office Scientifique et Technique des Pêches Maritimes' publishes the quarterly *Revue des Travaux de l'Office des Pêches Maritimes*, which contains valuable articles on many aspects of the fishing and allied industries. It also publishes periodically numerous *Notes et Rapports*, and also a series of *Memoirs* which consist of statistical surveys, summaries of recent research, etc.

(3) A valuable reference work containing photographs of fishing vessels, plans of harbours, etc. is E. le Danois, *Die Seefischereien von Frankreich*, volume VII of *Handbuch der Seefischereien Nordeuropas* (edited by H. Lübbert and E. Ehrenbaum, Stuttgart, 1930).

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(*a*) J. M. Chartrou, 'La Pêches à Quiberon', vol. XXXI, p. 263 (1922).

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(*d*) A. Dazin, 'Douarnenez, Port de Pêche', vol. XXXV, p. 179 (1926).

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Chapter V

MINING AND INDUSTRY

Introduction: Industrial Regions: Coal: Iron Mining and the Iron and Steel Industry: Shipbuilding: Locomotives: Aircraft: Non-ferrous Metals: Electricity: Chemical and Allied Industries: Textiles: Miscellaneous Industries: The Vichy Regime: Bibliographical Note

INTRODUCTION

The first steam engine in France was erected at Le Creusot in 1790, and it was only in the last decade of the eighteenth century that France began to emerge from an elementary stage of industrialization. The state had turned its attention to the fostering of industry and was encouraging the Leblanc process of manufacturing soda; beet-sugar refining industries were set going, new sources of saltpetre had been found, and bleaching by the use of chlorine had been developed. In addition, schools of engineering and industrial science had been set up. The stage was set, but although during the following half-century most of the industries of France were remodelled, there was no spectacular change such as was witnessed in England and later in Germany. Progress was almost imperceptible. St Etienne and Roubaix were the only two towns that increased in size with any rapidity during that period. The two main brakes on the spread of mechanization were cheapness of labour and lack of coal. The oldest colliery in the northern field, that of Anzin, was not opened before 1720, the steam pump was not introduced until 1734, and there was no serious exploitation of coal till 1850. True, the output had doubled between 1828 and 1847, but production in the latter year was only about 5 million tons, whilst consumption about that time, though greater, was only 7½ millions.

In the iron and steel industry, the works on the edges of the Central Massif—Le Creusot, Fourchambault, Montluçon and Decazeville—were still the most important, and as late as 1846, three-fifths of the iron smelting was still carried on in small and primitive charcoal furnaces. Of steam engines there were fewer than a score in use in 1815, and even by 1850 only 5,200 were in use as against 22,500 water mills of various kinds. Even in the textile industry, which developed far more quickly, there were two water mills for every steam mill as late as 1848. Lille had started the first steam spinning mill in 1801. In 1803 the flying shuttle was introduced into Alsace. This was the pioneer area of modern French textiles, and it experienced something approaching an industrial revolution in the first half of the century.

The disaster of the Franco-Prussian war fell upon France before her heavy industries had been established upon a firm basis. The loss of the Lorraine ironfields with their nascent industries and of the well-established textile industries of Alsace was a great blow. Nevertheless, after 1872 France set out resolutely on the road to recovery. Road, rail and canal construction under state encouragement went on apace. The successful search for the continuation of the Lorraine ironfield on the French side of the new frontier gave to France a share in the advantage of the newly invented Gilchrist-Thomas process which enabled phosphoric ores to be used for steel making. Nevertheless, progress was not rapid.

It was only with the opening of the twentieth century that the forward movement began to be marked. Between 1900 and 1913 industrial activity increased greatly. Then came the war of 1914–18, which put a stop to normal progress, but stimulated invention. There followed a period of reconstruction during which the devastated areas were rebuilt and re-equipped. This gave an opportunity for the closing of small uneconomical units, for amalgamations, for the rebuilding of factories on modern lines with modern equipment, and for the development of housing schemes to accommodate miners and other workers.

The return of Alsace and Lorraine and the control for fifteen years of the Saar coal-mining territory meant, for France, not only the possession of the largest and most easily worked ironfields of Europe, but the acquisition of a highly equipped, modern heavy metallurgical industry, as well as an important and specialized group of textile manufactures. France saw her industrial potentialities vastly improved, and the stimulus of a new orientation was beneficial to her status as a manufacturing country. Many difficulties were, of course, consequent upon this reorientation, not the least being the problem of finding new markets; for the German market organization, except for certain international iron and steel firms, was not acquired with the restored territory. Moreover, welcome as the additional coal supply of the Saar might be, without the access to Ruhr coal in exchange for iron, which the Germans had organized, France was still heavily handicapped by lack of metallurgical coke and by difficulties of communication between Lorraine and the northern coalfields. In fact, Germany lost more than France gained by the separation of Lorraine from the Ruhr.

The period of reconstruction, absorption and re-orientation during which France consolidated her position among the great manufacturing countries of the world, lasted until 1929, when the world economic depression set in. In this crisis, the well-balanced position of the country between large-scale and small-scale industries and the weight of her still important and almost self-sufficing agricultural activities saved France from catastrophe.

By 1936 recovery became marked, but not in time to stem the constantly recurring labour unrest, manifested by repeated strikes; nor to avert the attempt at conciliation by the granting of a 40 hr. week, the result of which was a distinct decline in industrial production. Rearmament, however, set the wheels of industry revolving again with a rapidly increasing tempo. This acceleration continued until the collapse of May 1940.

In all this story of spasmodic industrial development, France has lagged far behind her neighbours. This slow progress is best explained by a consideration of the most outstanding characteristic of French industrial activity—the persistence of a *petit-bourgeois* attitude among the organizers and of the peasant attitude among the workers of France. The preservation and adaptation of the individual skill of the peasant craftsman displayed in small factory and cottage industries and the canalization of this specialized but cheap labour in the service of large markets, has been the outstanding feature of the great French luxury industries; and although it has called for a high degree of intelligent organization and co-operation, it has militated against concentration. This has been particularly marked in the textile activities of the Lyons area and indeed in the bulk of French industry, other than that which is concentrated on the coal- and ironfields. Yet it is in the nature of things that this loosely knit but highly efficient method of production should eventually give way to concentration of effort and mass production, as competition becomes fiercer and improved communications encourage and facilitate migration of the worker to the larger towns.

To sum up: The peripheral situation of the major iron- and coalfields of the country and the inadequate supplies of coal and metallurgical coke have resulted in a slow pace of industrialization, in the continued quasi-self-sufficiency of French agriculture, and in the survival of many small-scale but highly specialized industries to supply the world's luxury markets.

As an index of the relative importance of the various industrial occupations in France, the following table is appended, giving the number of people employed in each of the main branches of industry; for comparative purposes and for completeness the non-industrial occupations are also included.

Industrial and other Occupations in France, 1931

Occupation	No. of persons employed	Occupation	No. of persons employed
Fishing	66,747	Textiles:	920,460
Forestry	58,447	Cotton, spinning and weaving	*192,036*
Agriculture	7,578,986	Wool, spinning and weaving	*167,467*
Mining	366,948	Silk	*123,085*
Quarrying	73,729	Hosiery	*120,199*
Food industries	541,671	Lace	*90,224*
Chemicals	238,297	Linen, hemp, jute	*99,987*
Rubber	63,124	Bleaching and dyeing	*67,681*
Paper and cardboard	103,281	Clothing	1,001,136
Printing, etc.	154,819	Leather, shoes, gloves	299,923
Ferrous metallurgy	147,034	Wood-working	649,270
Non-ferrous metallurgy	26,197	Transport	811,298
Engineering:	1,436,612	General commerce	2,329,219
Forging, edge-tools, wire	*206,441*	Banking, insurance	288,983
Mechanical engineering	*580,131*	Professions	657,757
Electrical engineering	*150,409*	Domestic and personal service	893,376
Building construction, etc.	886,138	Public services	1,313,415
Cement, bricks, pottery, glass	223,095	Total occupied population	21,611,835

From *Annuaire Statistique*, *1938*, pp. 104–5 (Paris, 1939).

INDUSTRIAL REGIONS

Figs. 63 and 64 show respectively by departments the percentage of the working population engaged in industry and the amount of steam power employed in driving machinery. Viewed in conjunction with Figs. 70, 83 and 81, showing iron and steel production, number of textile workers and consumption of electricity in chemical and metallurgical industries, these maps provide a broadly accurate picture of the distribution and relative importance of the major industries of France. Five dominant industrial areas stand out: (1) the northern region, comprising the two departments of Nord and Pas-de-Calais; (2) the eastern region, including Lorraine and Alsace; (3) the region of the Centre, whose boundaries are less well defined, but whose nucleus lies in the departments of Rhône and Loire. This area sends tentacles into the northern Alps (Grenoble area) and into the southern Jura;

(4) the region of the Garonne basin, including the Pyrenees, with control centres in Toulouse and Bordeaux. This is defined in Fig. 81, showing electrical energy consumed in chemical and metallurgical work; (5) the metropolitan area of Paris, the industrial importance of which is indicated by a remarkably high consumption of steam power in factories.

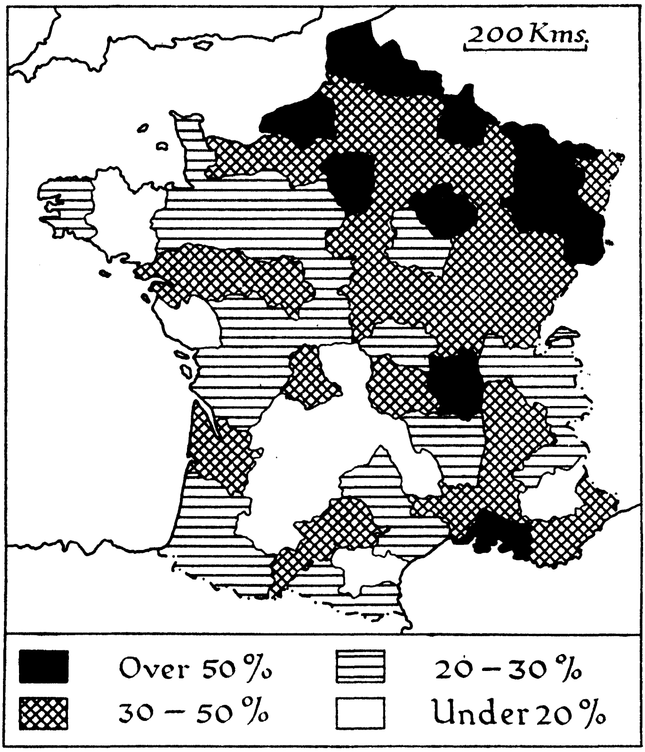


Fig. 63. Percentage of working population engaged in industry, by departments, 1936

Based on *Recensement général, 1936*, vol. 1 (Paris, 1938).

Apart from these main industrial regions there are very many isolated industrial towns such as Troyes and Reims carrying on specialized work of considerable importance—survivals of provincial independence.

The northern region is paramount, the main locating factor being, of course, the coalfield. The two departments of Nord and Pas-de-Calais produced, in 1938, 28 out of the 46 million tons of coal mined in France, 1 million out of the 8 million tons of pig-iron, and 1½ out of the 5 million tons of steel. Furthermore, the region is one of the chief textile centres, having 2·8 out of the 8 million ordinary cotton spindles of France and employing some 200,000 textile workers in the department of Nord alone.

The industrialization of the *eastern region* is based for the most part, not on local coal, although the Saar basin has had some influence on its development, but on the presence of the important *minette* iron ores of Lorraine. The output of ore in 1913 amounted to about 43 million tons; after the war of 1914–18 it rose to a maximum in 1929 of over 50 million. The ore from this field constitutes roughly 90% of the national production. About half the output is consumed in the iron and steel industries. This region

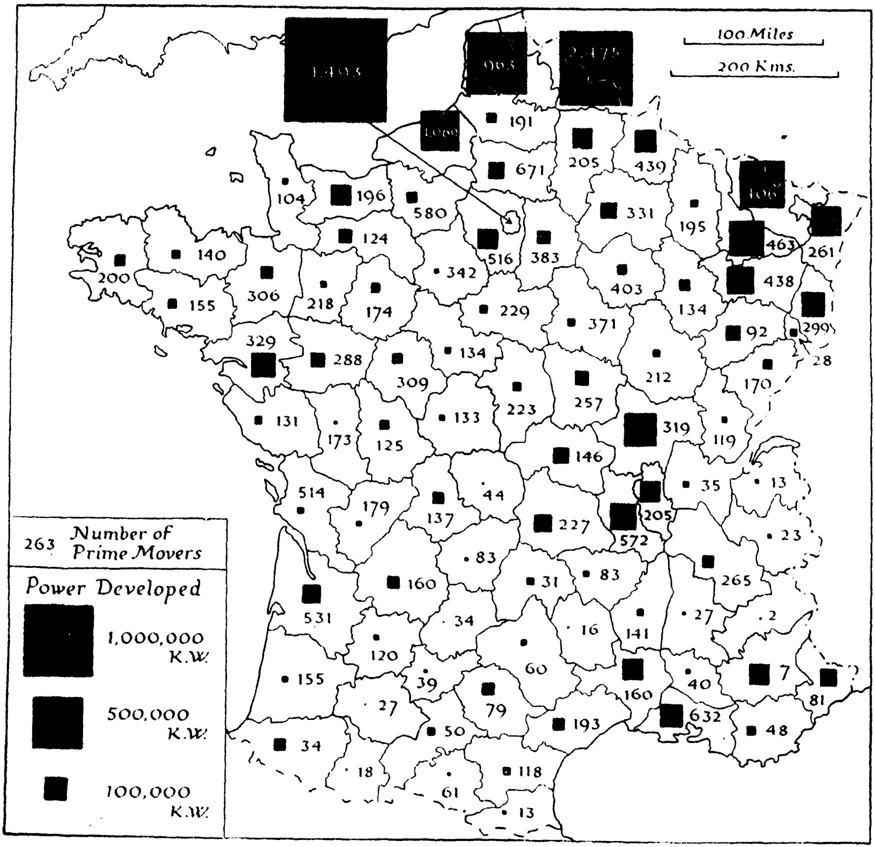


Fig. 64. Steam power in industry, 1936, by departments

Based on *Annuaire Statistique, 1938*, pp. 109–10 (Paris, 1939).

Squares proportional in area to developed power. In some areas (e.g. Paris, Lorraine, Pas-de-Calais and Le Creusot), where there are many very large power-producing plants, the average power of the individual prime mover (i.e. steam engine) is high; in other districts (e.g. lower Seine, Nord, St Etienne), where there are numerous small-powered engines driving the machinery of small textile or light engineering factories, the average power is much lower.

employs as many iron and steel workers as the north, but is concerned mainly with the production of pig-iron, of which its output in 1937 was 6·2 million tons, as compared with only 1 million in the north. The textile industry of the east was based on the water power, soft-water supplies and skilled domestic textile labour available in the valleys on the flanks of the Vosges—the eastern valleys in Alsace, the southern valleys in the Belfort district, and the western valleys in Lorraine. The area includes also the slopes of the northern Jura. The industries of these groups of valleys have between them 5 million cotton spindles and employ some 116,000 workers in the textile industry with all its branches.

The metallurgical industries of the *Centre* are based on the small coalfields of the eastern Central Massif, but they also rely, to a certain extent, upon coal imported into the district, and wholly on ore and metal from other areas. The district only employs one-fourteenth of the labour devoted to metallurgy in France, but is important because it includes the principal armaments works of the country, at Le Creusot and St Etienne. The engineering industry is, to a certain extent, centralized in Lyons, but light metallurgical work, dependent on the electric furnace, is located in the Alps and the Central Massif. The centre of textile manufacture is Lyons, but the industry occurs over a wide area—in the eastern uplands of the Central Massif, in the southern Jura, and in the northern Alps as well as in the Rhône valley. In 1931 the silk and rayon industry employed about 123,000 persons. Power is obtained from the small coalfields of the region, and, to an increasing extent, in the form of electric current generated from the torrents of the Alps, the Jura and the Central Massif. The raw material for the silk industry is now for the most part imported from the Far East via Marseilles. Smaller quantities come from Syria and Italy.

A south-eastern sub-region centres in Grenoble. Here again modern development is clearly allied to the exploitation of hydro-electric power. Powerful glacier-fed torrents and glaciated valleys with abrupt breaks of slope are the geographical conditions underlying this development. Conditions favouring the generation of hydro-electricity are not conducive to accessibility and ease of communications. Hence raw materials must be light. On the other hand, the electric furnace is necessary for the production of aluminium and of certain types of steel and ferro-alloys and for electro-chemical work. The majority of French aluminium works are situated in the Alpine valleys. Small-scale industry, thanks to electric power and a certain amount of state encouragement, has penetrated into the heart of the Alps, in the upper valleys of Isère and Arc, but the more important industrial groups are found in the broad vale of Grésivaudan that lies between Grenoble and Chambéry. Glove factories, cement works, engineering shops, silk and rayon factories line the edges of the plain. There are no less than 357 silk-weaving establishments in the department of Isère alone. Thus the industrial sub-area of Grenoble overlaps, to a considerable extent, that around Lyons.

The south-west, or Pyrenean region, looks mainly towards Toulouse, but has a western focus in Bordeaux. As in the Alps, economic development has accompanied the utilization for electric power of the mountain torrents. Apart from a little mining of iron and silver-lead-zinc ores and of some of the rare metals, activities are concerned with electro-metallurgical and electro-chemical work. Electrical energy is also supplied to Toulouse, where an important nitrate plant has been established. Though the Pyrenean industrial activities come a very long way behind those of Lyons and Grenoble, the two regions have much in common. Power is supplied from the upper basins of the Adour, Ariège and Tet to the railways and industries. The quarrying of building stone and of limestone for cement, the mining and reduction of bauxite, iron mining and a little steel production are the chief of the mountain industrial activities. In Bordeaux and Toulouse there are leather and skin industries; whilst the manufacture of superphosphates, of explosives and recently of aeroplanes has reached some importance.

Greater Paris is the largest manufacturing region in France, its population of 6 millions providing both a reservoir of labour and a market. The luxury industries, with which it is popularly associated —such as fashion goods, fabrics, jewellery and glass-ware, *objets d'art*, etc.—are of relatively minor importance. Besides these and the usual 'metropolitan' industries—printing, food production, textiles, furniture-making, public works contracting—many others are highly developed, especially the metal-using industries. All the important motor-car factories of France, save one, are found here, many of the aircraft factories, and electrical and light metal industries in great variety (see Fig. 35). The heavy industries, moreover, are also considerable: St Denis is one of the two most important centres in France for marine engineering, and the construction of heavy electrical equipment, factory machinery, barges and small craft, together with the manufacture and repair of rolling stock, all have important centres in the region (see Fig. 36).

Electric power is derived mainly from hydro-electric generating plants in the Central Massif, but the Paris region has six large thermal-electric stations (see Fig. 78) which supplement the current output as and when required. Large quantities of coal are consumed by individual factories, and the gas works also play an important part in industry. In 1936 the department of Seine produced nearly 650 million cu.m. of gas—40% of the entire French production—and nearly 700,000 tons of gas coke. The power stations and gas works, like the heavier industries, lie mainly downstream at St Ouen and beyond Gennevilliers in the river loop, and upstream at Ivry and Vitry, with minor groups in the central section of the river around Issy, so as to secure adequate supplies of water, cheap water transport for coal imports, and ample building space in the low ground of the river flood-plain, which is in any case less desirable for residential sites.

While the best known products of Parisian industry are made in small workshops, the bulk of the industrial output comes from larger establishments; the distribution of the factories is shown in Fig. 34. They lie in a belt of varying width which almost encircles the nineteenth-century city except where the Bois de Boulogne, to the west, forms a non-industrial gap. As far as transport facilities are concerned, the river, railways and roads seem to have offered more attractive locations for industry than the canals, except along the northern end of the St Denis Canal. The heaviest metal industries lie near the river at St Denis, Gennevilliers and farther downstream, though there is a subsidiary centre above the Marne confluence, and an important centre at Corneuve and Le Bourget, along the Nord railway leading to Laon. The electrical, motor-car and aircraft industries, the latest to develop, have a pronounced westward location towards the river at Suresnes and Courbevoie with an isolated group in the south-west bend of the great loop at Boulogne-Billancourt. In the earlier development of factories, within the limits of the fortifications, the general metal industries concentrated in the south-west and in the north-east, but in their later development in the suburbs they kept almost entirely to the north and north-east (cf. Figs. 35 and 36). The construction of ships, barges, dredgers, tugs, etc. has two centres—from St Denis downstream to Bezons, and upstream beyond the Marne confluence. Textiles have, in general, an eastward location; heavy chemicals are mainly concentrated at St Denis, but the manufacture of soap, photographic and pharmaceutical materials is fairly widespread; the tanning industry is concentrated along the Bièvre river.

In the present century the greatest expansion has been westwards and downstream, with subsidiary movements to the north-east towards Le Bourget and south-eastwards beyond the Marne confluence. Recent years have seen a continuation of these tendencies with the establishment of the Ford factory at Poissy, just below the Oise confluence, and aircraft works at Colombes, Sartrouville and Les Mureaux. There has been expansion, too, in the district from Choisy to Villeneuve-St Georges above the Marne confluence, and along the main Orléans and P.L.M. railway lines. At Champagne-sur-Seine, for example, there is a new factory for the manufacture of electrical equipment covering 32 ha. In general, however, the expanding industry of the Paris region is attracted not south-eastwards towards the heart of the country, but north-westwards towards the lower Seine, the ports of Havre and Rouen, and the canals leading to the northern coalfield.

COAL

France has always been deficient in coal. The average production for the years 1932–8 was about 46 million tons, whilst the average consumption for the same period was 71 million tons. The following tables give some details of production and consumption.

The Northern Coalfield

France has only one large coalfield. It lies in the departments of Nord and Pas-de-Calais, and is a continuation of the Belgian field that skirts the northern edge of the Ardennes. The French part of the field is worked in a long curving belt at the foot of the chalk ridge of Artois from the neighbourhood of Aire to the Belgian

Coal Production (million tons†)

Year	Nord and Pas-de-Calais	Moselle*	Loire	Other areas	Total	LIGNITE
1913	27·42	3·80	3·78	8·88	43·87	0·79
1929	34·92	6·09	3·78	6·99	51·78	1·20
1932	29·94	5·27	3·01	8·04	46·27	0·01
1936	28·41	5·45	3·24	8·13	45·23	0·94
1937	27·18	6·14	3·13	7·85	44·31	1·01
1938	28·24	6·74	3·27	8·25	46·50	1·06

* 1939 frontiers.

† In this and succeeding tables the figures are in *metric* tons.

Coal Production by Departments, 1936

Department	District	Output (thousand tons)
Allier	Commentry	130
Hautes-Alpes	Briançon	23
Aveyron	Decazeville, Aubin	627
Cantal	Mauriac	105
Creuse	Ahun	13
Gard	Alès	2,099
Hérault	Graissesac	214
Isère	La Mure	319
Loire	St Etienne	3,241
Haute-Loire	Brioude, Brassac	144
Moselle	Rosselle valley	5,448
Nièvre	Décize	288
Nord	Douai-Anzin	9,354
Pas-de-Calais	Béthune-Lens	19,057
Puy-de-Dôme	Brassac, St Eloi	751
Haute-Saône	Ronchamp	102
Saône-et-Loire	Le Creusot, Epinac	2,382
Savoie	Maurienne-Tarentaise	34
Deux-Sèvres	St Laurs	10
Tarn	Carmaux, Albi	834
Vendée	Vouvant, Chantonnay	50
Others	—	227
Total	—	45,228

Classification of Coal (1936 *production in thousand tons*)

	Class of coal						
	Splint coal	Gas coal (long flame)	Caking coal (forge and smiths)	Steam and coking coal (short flame)	Semi-anthracite	Anthracite	Total
Carbon content %	70–80	80–85	84–89	88–91	90–93	93–95	—
Volatile matter %	45–40	42–43	32–26	26–18	18–10	10–8	—
Total output	5,905	9,491	6,801	8,294	6,510	8,227	45,228
Nord and Pas-de-Calais	1,574	5,527	4,977	5,991	4,809	5,533	28,411
Moselle	4,090	1,359	—	—	—	—	5,449
Loire	—	965	274	1,278	490	234	3,241
Burgundy	241	565	662	438	234	530	2,670
Tarn and Aveyron	—	627	834	—	—	—	1,461
Gard and Hérault	—	—	—	320	820	1,173	2,313
Others	—	448	54	267	157	757	1,683

From *Statistique de l'Industrie Minérale, 1936* (Paris, 1938).

Consumption of Coal, 1936

Use	Million tons	Percentage of total
Mines (including 2·3 million tons converted into electricity and 1·18 million supplied to works)	5·55	7·93
Metallurgy: Coal: 1·68 million tons } coal equivalent Coke: 6·63 million tons	10·29	14·69
Railways	9·80	13·99
Gas works	3·88	5·54
Electricity supply	4·02	5·73
Bunker coal	0·98	1·39
Domestic and miscellaneous	35·54	50·73
Total	70·05	100·00

Consumption by Regions, 1936

Region	Department	Million tons	Percentage of total
Northern industrial area	Nord	7·54	20·9
	Pas-de-Calais	5·06	
Lorraine	Moselle	5·89	16·4
	Meurthe-et-Moselle	3·99	
Paris	Seine	6·98	11·6
Lower Seine region	Seine-Inférieure	1·94	6·4
	Seine-et-Oise	1·92	
Lyons-St Etienne	Loire	1·39	4·5
	Rhône	1·33	

frontier (Fig. 66). The coal lies beneath a hidden upfold of chalk overlain by soft, sandy deposits which rise slightly above the Flanders plain to form the Pévèle and Gohelle districts. The deep-seated strata have been greatly disturbed by faulting and overthrusting and the coal measures have been folded over upon themselves in the southern part of the basin, so that they lie, in places, beneath sedimentary rocks of an earlier age. The coal zone is divided by faults into a series of sub-basins, besides which faulting has frequently interrupted and displaced the seams. This makes mining difficult and expensive. The French part of the coalfield covers about 51,000 ha. and forms a narrow belt about 100 km. long and 5–15 km. wide. From the Belgian frontier it passes west-south-west through Valenciennes towards Douai and then turns west-north-west through Lens and Bruay. It ceases to be worked beyond Fléchinelle, just south of Aire, but its presence has been proved in the Boulonnais, suggesting a continuation of the deposits in the direction of Kent.

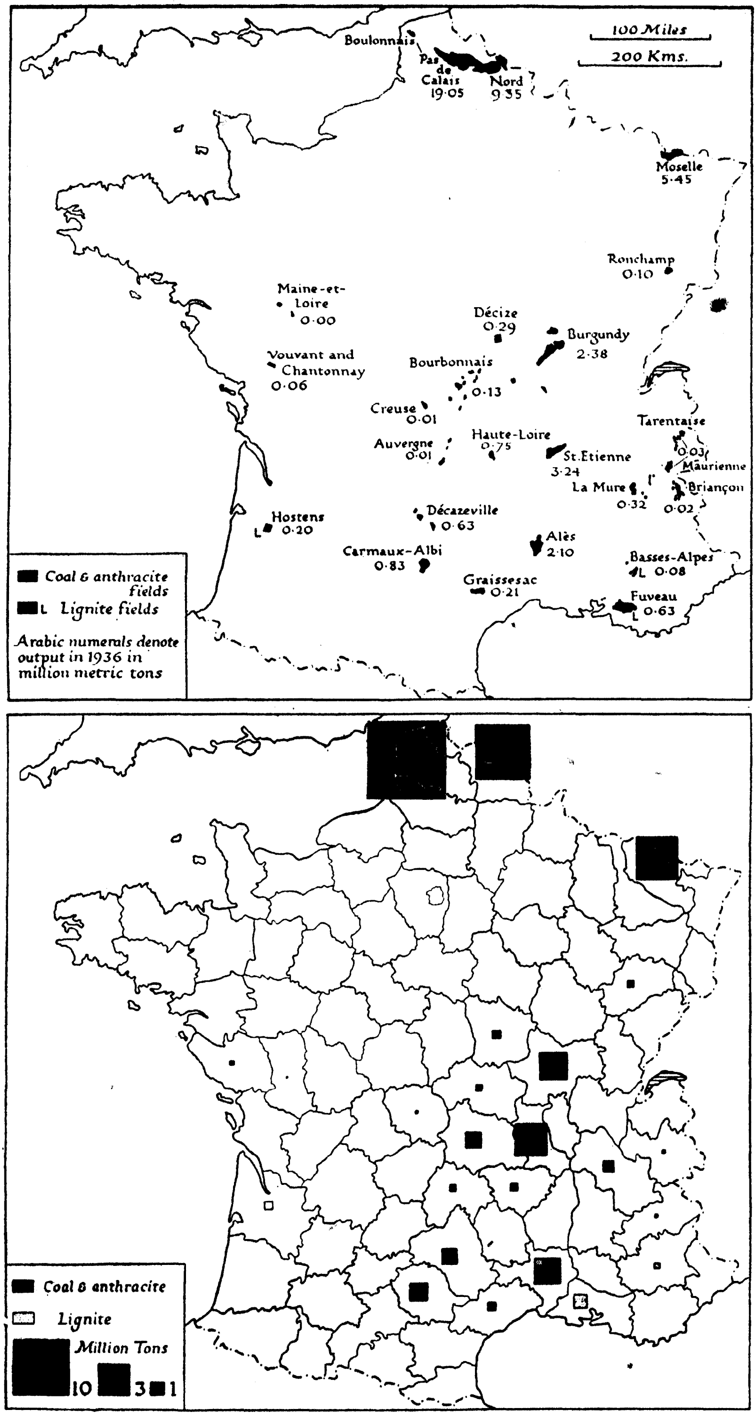


Fig. 65. Above: distribution of coal and lignite fields, with 1936 production figures. Below: output in 1936 by departments

Based on *Statistique de l'Industrie Minérale, 1936* (Paris, 1938).

There are many thin seams, some of them less than 0·4 m. thick, the average being about 1 m., and mining is carried on at depths exceeding 900 m., the average being 400 m. In parts of the Nord department the seams dip at an angle of 40°. Mining is easier in the Courrières-Lens-Grenay district of Pas-de-Calais, where the strata dip less steeply and where there are some thick seams. Intervening barren rocks divide the field into two sections—that of Valenciennes in the east and that of Lens in the west. The quality and type of coal varies greatly in different parts of the field and even in the same district (cf. table on p. 180). For example, at Aniche coal of highly volatile composition occurs in the upper seams while hard anthracite is mined at greater depths.

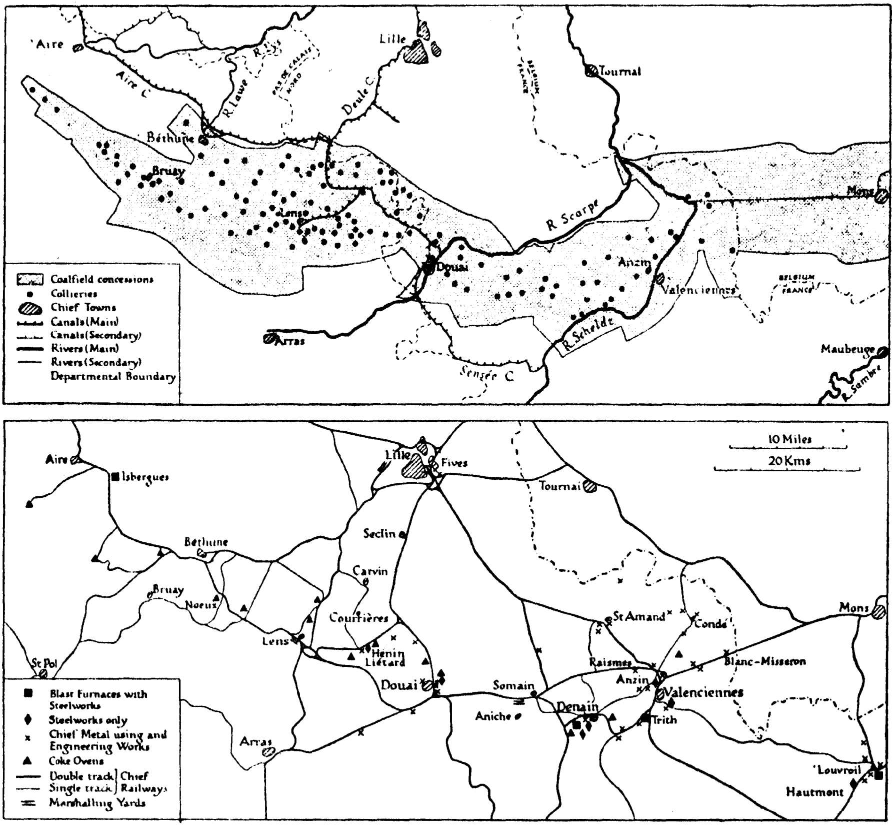


Fig. 66. The northern coalfield. Above: distribution of collieries in relation to navigable waterways. Below: distribution of coke ovens, iron, steel and engineering industries in relation to railways (see also Plates 47, 48 and Fig. 73)

Based on the *Carte Industrielle* and the 1 : 25,000 maps forming G.S.G.S. series 4041.

During the war of 1914–18 the mining area suffered great damage by shelling and through the flooding of the mines by the Germans in 1915–16. In the 10 years succeeding the war the district was restored, the mines re-equipped on modern lines and their productive capacity improved. Since then mining methods have continued to make progress. The amount broken down with the pneumatic pick-hammer in Pas-de-Calais increased from 86·3% of the output in 1929 to 92% in 1936. In 1913 the percentage had been only 4·7. In the Nord department mechanical extraction reached 99·1% in 1936, but dropped to 97·8% in 1937. Between 6,000 and 9,000 pneumatic drills are used, and there are over 1,500 km. of pipes to carry compressed air to the coal faces. Coal mining is in the hands of a dozen large firms and several smaller ones. Eight of the large companies have an annual output of between 2 and 4 million tons each.

The making of *metallurgical coke* (Figs. 66, 67) takes place at many points on the coalfield, particularly in the Lens (Pas-de-Calais) section, which has about 1,500 out of a total of 2,500 coke ovens. In this western part, almost all the coke output is from local coal, but in the east there are a number of large installations, set up for the most part since 1918, which use in addition Belgian, German and Dutch coal. About one-half of the French output of metallurgical coke (which amounts to about 5 million tons a year) is made in the pithead cokeries of the northern coalfield, the location of which is indicated on Fig. 66. The output of gas from these cokeries in 1936 amounted to 1,327 million cu.m., most of which was used directly in the mining, metallurgical and chemical industries or for the generation of electricity. Apart from gas, the chemical by-products of coking have been rapidly increasing in importance, and now far outweigh in value the gas and coke produced (see below, p. 224).

In comparison with that of metallurgical coke and gas produced from coke ovens, the output of coal-gas and gas-coke from retorts at gas works is small—only 42,000 tons of coke and 35 million cu.m. of gas in 1936. A gas grid, similar to those of Belgium and the Ruhr, for the pooling and distribution of coke-oven gas and coal-gas, has been established. It covers a large part of northern France, the main centres being Béthune, Douai, Lille and Valenciennes.

The manufacture of *patent fuels* affords an economic means of using up coal dust and waste, which is mixed with pitch derived from tar distillation, or imported. It is carried on at Aniche, Ostricourt, Anzin, Bruay, Nœux-les-Mines (see Plate 47) and Courrières. Briquette making (10 kg. blocks of fuel used on railways and ships)

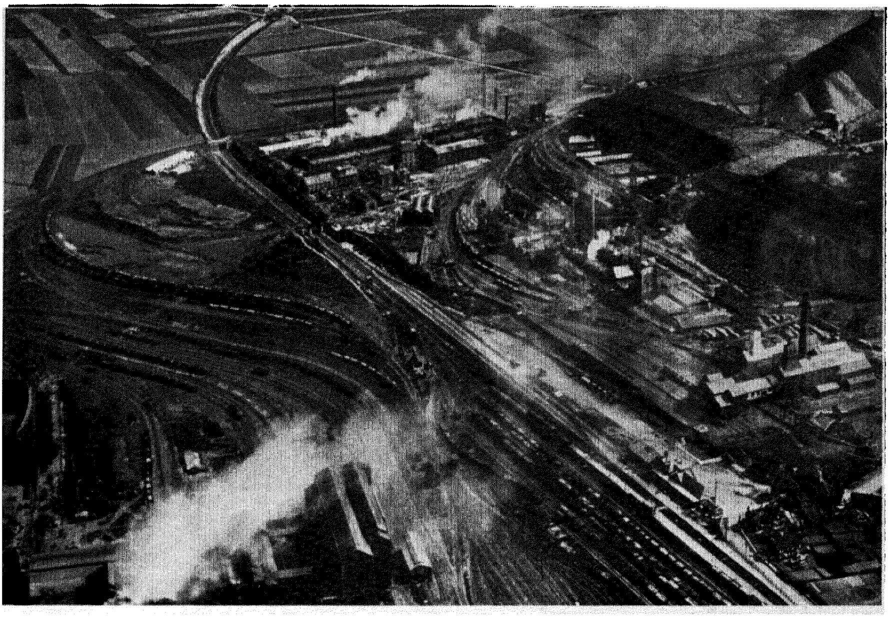


Plate 47. Coal mining at Noeux (Pas-de-Calais)

The installation comprises the pit-head, shale-heaps, a briquette factory and extensive railway sidings, in a setting of cultivated fields.

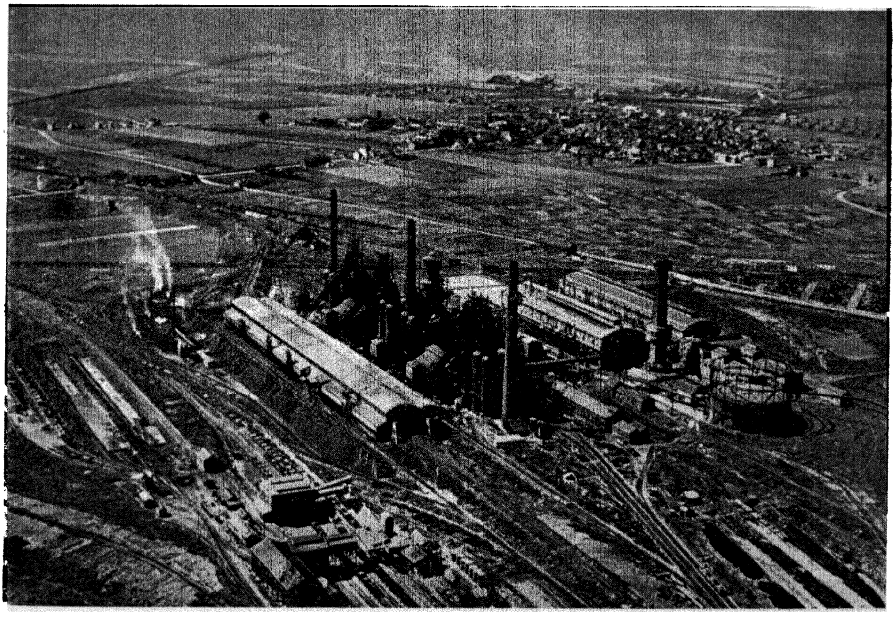


Plate 48. Iron and steel works at Escaudin (Nord)

This modern works lies just west of Denain (see Fig. 66). In the centre is a group of four blast furnaces; to the right, steelworks and gas-holder; in the distance, beyond a stretch of arable fields, a 'garden city' on the outskirts of the old village.

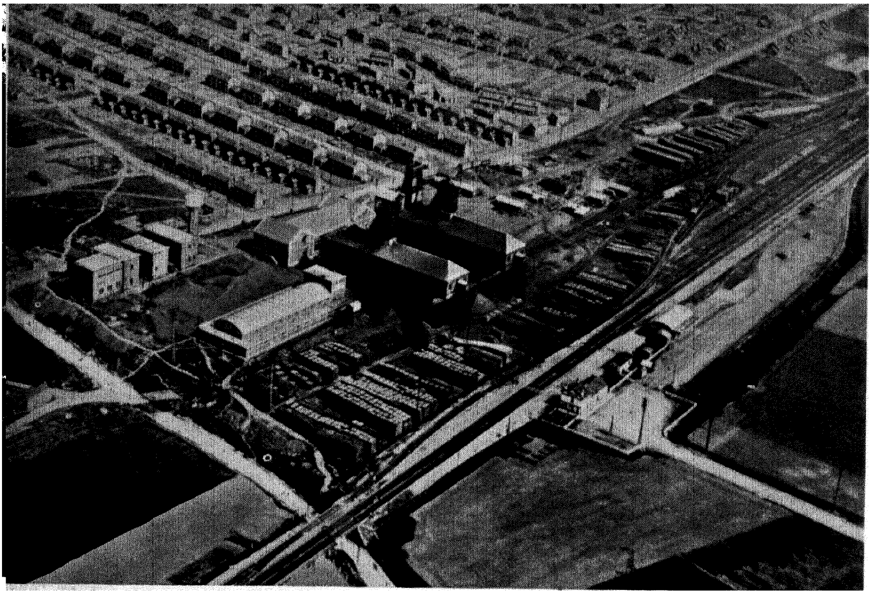


Plate 49. Coal mine at Méricourt (Pas-de-Calais)

A comparatively small mine (compare Plate 47), but none the less typical, with pithead gear, dumps of pit-props, railway sidings and a modern workers' village of houses with gardens—known in this case as 'cité du Maroc'. The mine lies about 4 km. south-east of Lens.

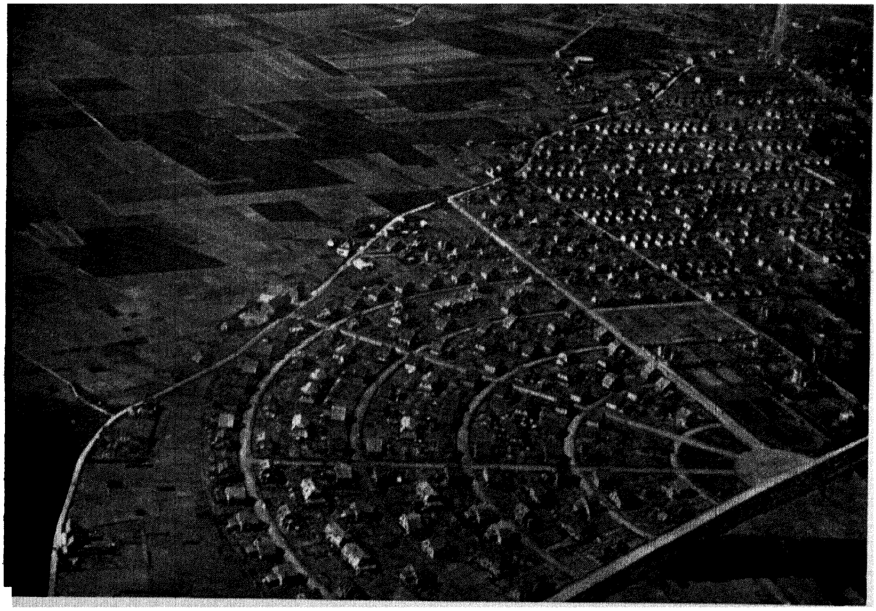


Plate 50. 'Cités ouvrières' near Lens

A 'garden city' built for miners by a colliery company—a considerable advance on the crowded urban industrialism of the nineteenth century.

and the making of 'ovoids' for domestic stoves have attained considerable importance. Nearly three-quarters of France's patent fuel production, which amounts to 8 million tons, comes from works attached to coal mines, and of this, in 1936, 57·5 % (nearly 3·7 million tons) came from the northern coalfield. Aniche produced the bulk of the briquettes.

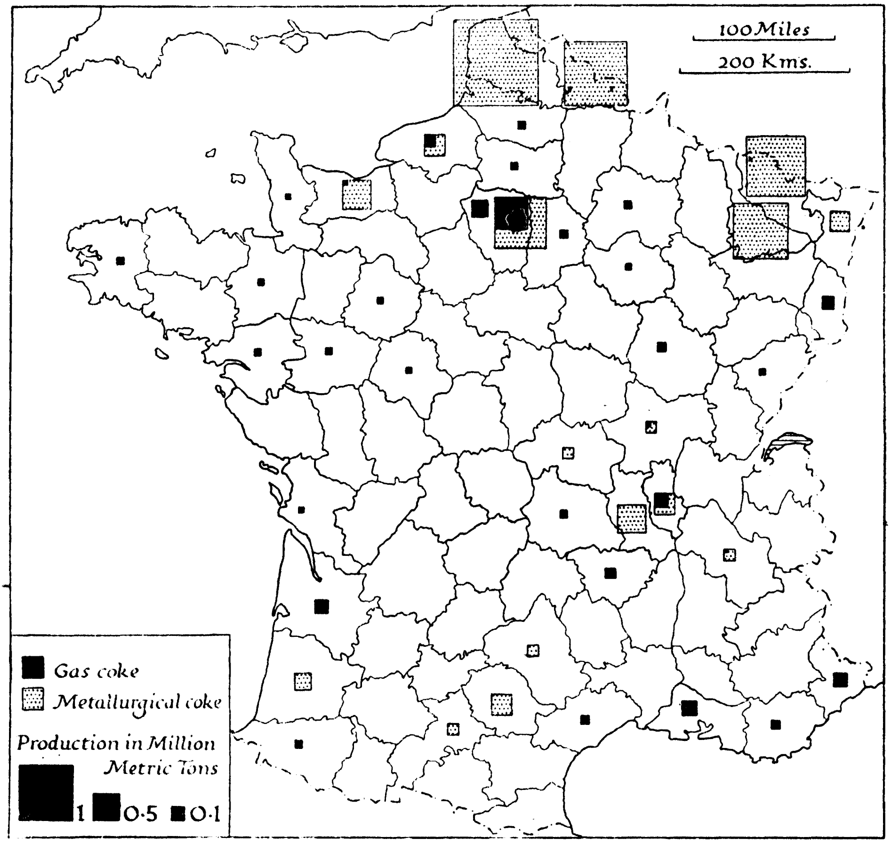


Fig. 67. Output of coke by departments, 1936

Based on *Statistique de l'Industrie Minérale, 1936* (Paris, 1938).

Squares proportional in area to output. In general, metallurgical coke, i.e. for use in blast furnaces and in certain other operations in iron and steel manufacture, is produced in batteries of ovens, either at the pithead in coal-mining areas or adjacent to smelting works. Gas coke, used domestically and in factories for heating and the raising of steam, is a by-product of the manufacture in retorts of ordinary coal-gas by gas works. Metallurgical coke is much harder and less frangible than gas coke: it has to withstand the heavy burden of ore in the blast furnace.

In the modernized collieries of this coalfield the output is now used to the utmost: new methods of washing and screening ensure the maintenance of an even grading of the coal and the efficient collection of dust, whilst patent fuel making, coking, the making of tar products and finally the hydrogenation of coal to produce fuel oil are ancillary industries (see pp. 224–5). The reconstruction of the devastated coalfield area after 1918 made possible a great improvement in the housing of the mine workers, and the older, rather drab rows of gardenless cottages ('corons') have given way to 'cités' or 'garden villages' of separate houses, each with its own garden, laid out in rectangular or other geometrical patterns (see Fig. 73 and Plates 49 and 50).

The Eastern Coalfield

The Saar coalfield, handed back to Germany in March 1935, extends beneath the frontier into the French department of Moselle in Lorraine (see Fig. 71). Coal is mined in the valley of the Rosselle, a left-bank tributary of the Saar, and in the small valleys of the Merle and the Bisten. Farther west the coal measures lie too deep for exploitation, but faulting brings them to within 790 m. of the surface at Pont-à-Mousson on the Moselle. It is not yet mined here, but its presence beneath the iron ores of the district may one day be an important factor in the development of the Lorraine iron industry. Modern improvements in the technique of deep mining, however, have made possible a small westward extension of the Lorraine field. During the 15 years in which France controlled the Saar mining interests, this Moselle section of the field was vigorously exploited: the Germans even accused the French of extending their galleries across the frontier into Saar territory. Be that as it may, output of coal in Moselle increased from 3·79 million tons in 1913 to 6·7 million tons in 1938, and has provided a valuable contribution since 1935 to France's depleted resources. The quality of the seams improves on the whole with increasing depth. The Petite-Rosselle mines have a seam 3·4 m. thick and produce coal of good quality. The La Houve mines give only poor-quality coal, but this is utilized at the pithead for the generation of electric current. The deep mines of Hôpital and Merlebach are worked by German iron and steel firms.

Saar coal, unfortunately, does not lend itself satisfactorily to the production of metallurgical coke without the admixture of other coal (cf. table on p. 180), so that the steel industries of the Saar territory depended largely on coal and coke imported from Westphalia. Nor is the utilization of coal for by-products very far advanced, but the use of small coal in the generation of electricity is important.

Coalfields of the Central Massif (Fig. 68)

The coal measures of the Central Massif are seamed with valleys following the original lines of folding and faulting, a condition which has greatly assisted mining and communications and therefore industrial development. Good examples are afforded by the line of depression that leads from the Rhône valley to the Loire along the St Etienne coalfield between Givors and Firminy, and that in which the Blanzy-Montceau-les-Mines mines occur in the Le Creusot district. This natural passage-way is followed by two main roads, a railway and the Centre Canal (cf. p. 205).

The Blanzy concessions employ about 9,000 workers and produce about 2 million tons of coal a year, as well as 300,000 tons of patent fuel. The Autun section of the Epinac field, a little farther north-west, produces in addition about 100,000 tons a year of oil shale, which is distilled locally.

The St Etienne field in the department of Loire had an output of 3·24 million tons in 1936 (Plate 51). Some of the coal makes good metallurgical coke, which is used locally (cf. p. 204). In 1936, 372,000 tons of coke were produced from 233 ovens at the collieries of St Etienne, Roche-la-Molière and Firminy, together with the usual chemical by-products. Much of the rest of the coal is gas-coal, and gas is manufactured and distributed over a wide area. Some is used in the generating of electricity. The small anthracite field of Roanne is also in the department of Loire.

Farther south in Gard, at the foot of the Cévennes, the Alès coalfield with the mines of Grand-Combe and Barrège produce some 2 million tons of high-quality coal. About one-half of the output is used for the manufacture of patent fuel, in the production of which the department of Gard ranks second to that of Nord. The rest is mainly consumed by the local metallurgical industries.

From north to south, through the centre of the Massif, runs a line of faulting along which small coal basins are strung out. The Décize mines in Nièvre on the northern edge of the Massif encouraged the establishment of a small specialized steel industry, as also did those of Commentry. This last only produces half a million tons, but is useful to the industries of Montluçon. In Puy-de-Dôme the engineering and other industries of Clermont-Ferrand receive coal from the small basin of St Eloi, in the 'coal furrow', and Brioude and Brassac in a small upland basin in Haute-Loire also contribute small quantities.

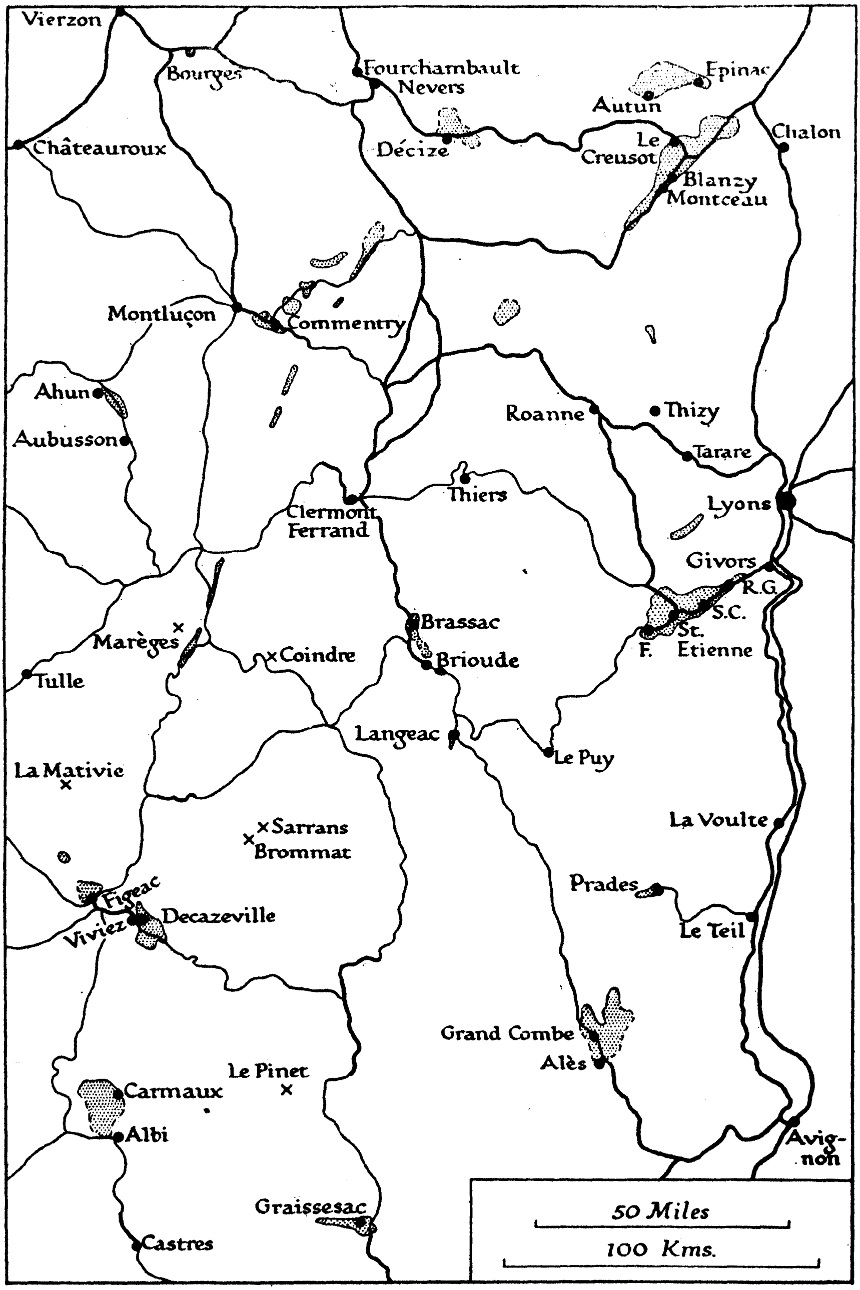


Fig. 68. Coalfields and industrial centres of the Central Massif

Coalfields stippled; chief railways are shown (double-track thick lines, single-track thin lines); the main hydro-electric power stations are indicated by crosses (cf. Fig. 78): R.G. Rive de Gier; S.C. St Chamond; F. Firminy. The industrial centres are referred to in the paragraphs on iron and steel and textiles (pp. 204–5, 236 and 239).

The two most important fields of the western part of the Massif lie in the river basins of the Lot and Tarn. The Aubin mines near Decazeville produce over half a million tons; they supply the armaments works of Tulle and the metallurgical works of Villefranche-de-Rouergue, Decazeville, and Viviez. The Carmaux-Albi collieries produce just under a million tons for the railways that focus in this district, for the steel works of St Juéry and for the woollen industries and foundries of Castres and Mazamet. The Graissesac collieries have developed rapidly of late, and produced 200,000 tons in 1936.

Lignite

French lignite production is small compared with that of Germany, for example—less than 1 million tons as against about 180 millions—and its significance in the national economy is not great (Fig. 65).

Lignite Production, 1936

Region	Department	District	Thousand tons
Provence	Bouches-du-Rhône	Fuveau	631
	Basses-Alpes	Manosque	79
South-west	Gironde	Hostens	198
Comtat	Gard	Barjac	21
	All other areas		14
		Total	943

There are small deposits in the Cretaceous and Tertiary rocks at numerous places in southern France, particularly in the departments of Hérault, Gard and Landes, but the only two worked to any extent are those of Fuveau, north-east of Marseilles in Bouches-du-Rhône, and of Hostens in Gironde; in both cases the output is employed for the most part in the generation of electricity, but the Fuveau lignites are also employed in the production of alumina from the bauxite deposits of Var (cf. p. 213).

IRON MINING AND THE IRON AND STEEL INDUSTRY

The following comparative table illustrates the relative position of France in the coal, iron and steel industries of north-western Europe, the U.S.A., and the rest of the world.

Output of Coal, Iron Ore, Iron and Steel in 1936
(*in millions of tons*)

Country	Coal and lignite	Iron ore	Pig-iron	Steel
France	46·1	33·2	6·2	6·7
Great Britain	228·5	12·7	7·7	11·8
Belgium	27·9	—	3·2	3·2
Luxembourg	—	4·9	2·0	2·0
Germany	319·7*	6·6	15·3	19·2
U.S.A.	488·8	48·6	31·0	47·8
Whole World	1,430·0†	170·0	90·2	121·7

* 161·3 lignite. † 200·0 lignite.

Four separate groups of industries are involved in what is commonly referred to as the 'Iron and Steel Industry', and the geographical influences on their location are worthy of separate analysis.

(1) The mining of iron ore is clearly dependent on geological circumstances for its location, but the mode of utilization of the ore varies in accordance with its iron content and the nearness of the field to fuel supplies. Generally speaking a low-grade ore (iron content 20–30 %) will tend to be smelted on the spot because of the high cost of transporting bulky material only one-quarter or one-third of which is actually going to provide useful metal. A high-grade ore, on the other hand (iron content 50–70 %), may more economically be transported to a coalfield for smelting. Thus a large proportion of the lean Lorraine ore is smelted locally, whereas the richer Algerian ores are sent by sea to the ports of France and Britain.

(2) Blast furnaces for smelting iron ore may generally be found in one of three types of situation:

(*a*) At the source of the fuel, e.g. the northern coalfield and Le Creusot, especially if, as in these two cases, the industry is of long standing, and was based originally on small local ore supplies.

(*b*) On the ore field, e.g. Lorraine, using coal or coke imported from a distance.

(*c*) At ports, e.g. Boulogne, the lower Loire, and Boucau (Bayonne), where imported ore and fuel are both available.

(3) The steel-making industry has for its main raw materials iron, either molten or in pig form, and scrap; in 1936 the consumption of scrap was 2·7 million tons. The industry may therefore be located:

(*a*) Adjacent to a blast-furnace works, where molten iron from the furnaces can be converted directly, without loss of heat, into steel (e.g. many works in Lorraine); this is the usual method in the great modern iron and steel works, where, too, the coal is coked on the spot, and power and by-products are derived from coke-oven and blast-furnace gases.

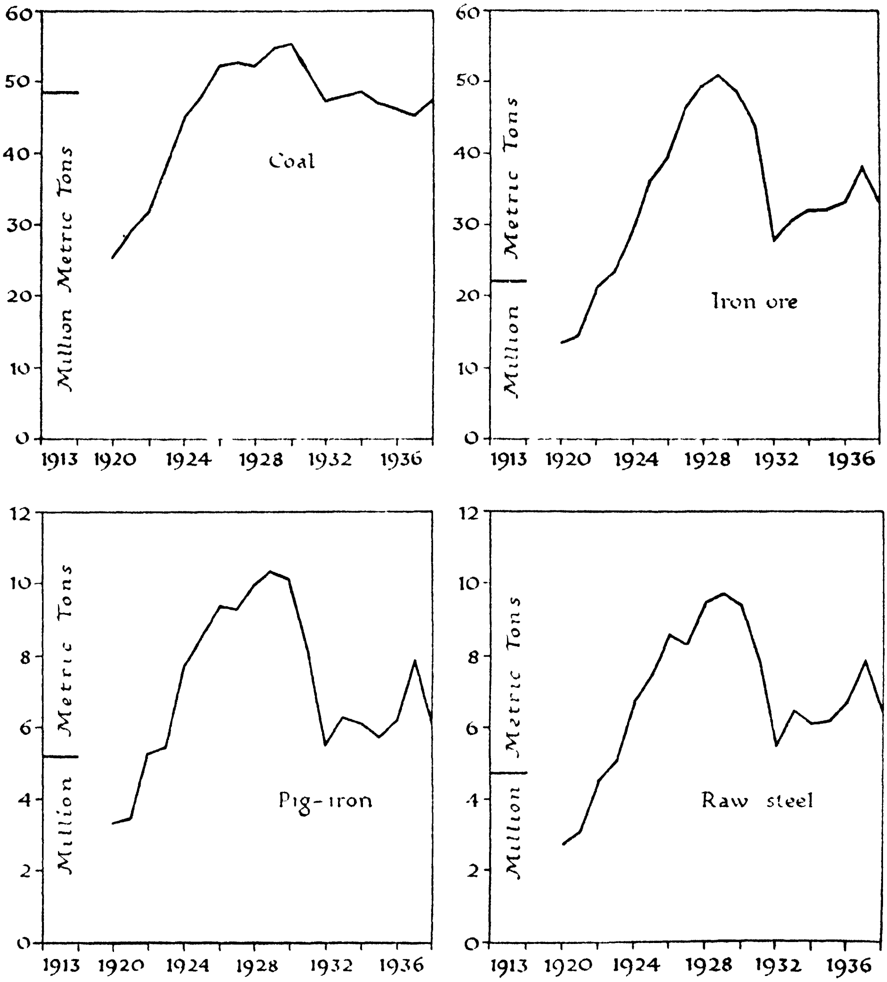


Fig. 69. Graphs showing output of coal, iron ore, pig-iron and steel, 1913, 1920–38

Based on *Annuaire Statistique, 1938* (Paris 1939).
These graphs form a rough index of French industrial prosperity.

(*b*) In an engineering area where abundant scrap is available as a 'waste' product of the engineering works which at the same time form an assured local market for the steel output (e.g. St Etienne, the northern coalfield, and Paris).

(*c*) In an area where hydro-electric power is available for use in special small-capacity furnaces producing mainly high-grade alloy steels (e.g. in the Alpine valleys).

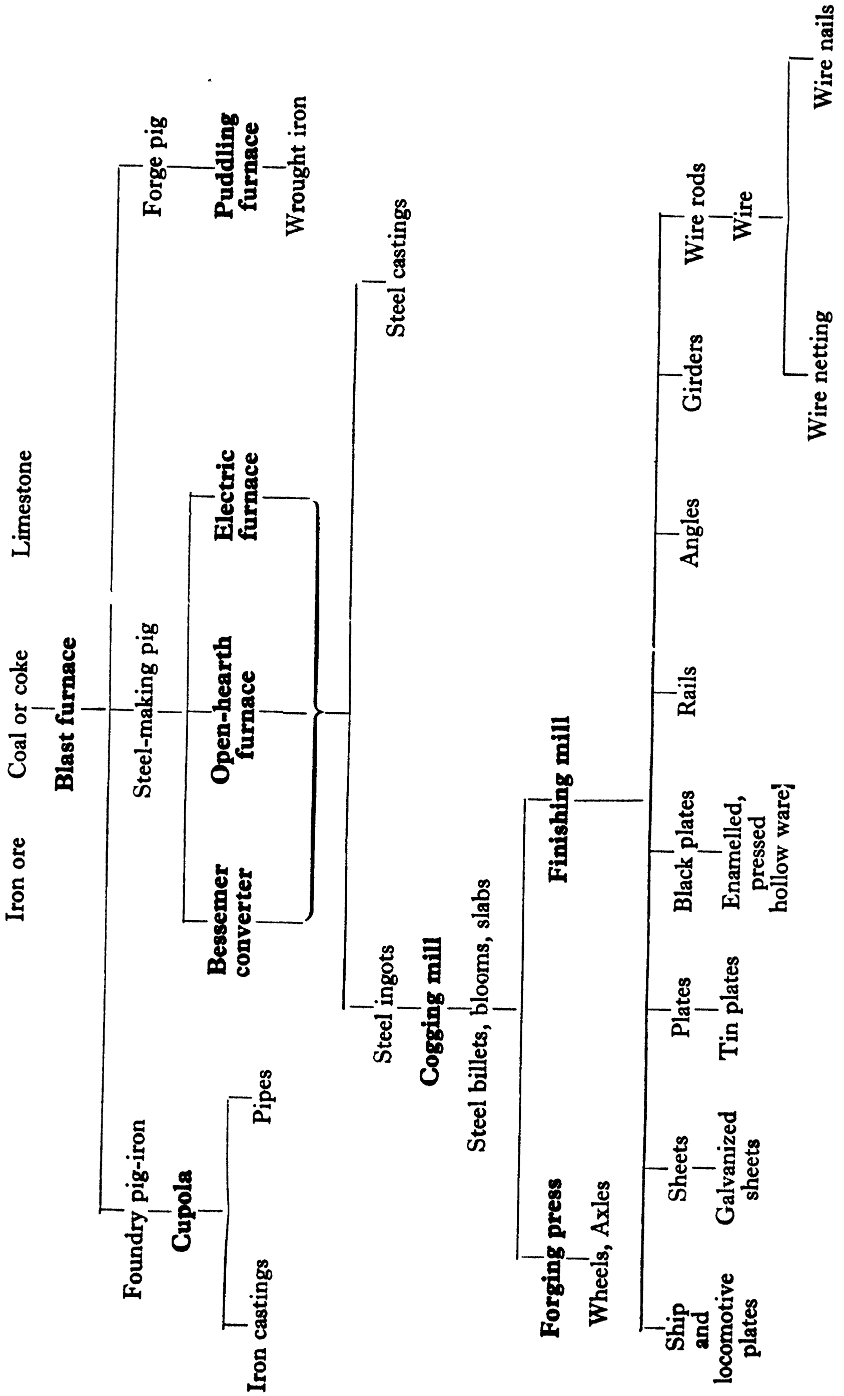
The process of steel making will also vary according to geographical circumstances. Thus an area far from coke supplies will tend to use the Bessemer converter, in which fuel consumption is almost nil, whilst the coalfield engineering regions will use the Siemens open-hearth furnace which uses fuel, but can take a large percentage of scrap. Further, since the bulk of the ores used, whether from Lorraine or Algeria, are phosphoric, basic linings to both converters and open hearths will be employed. So Lorraine makes what the French call 'Thomas' steel (basic Bessemer), the northern coalfield, St Etienne and most of the other centres make 'Martin' steel (basic open hearth). Crucible steel is mainly made in small quantities for special purposes, e.g. the making of armaments, cutlery, etc., and so the manufacture will tend to attach itself to the market for its products. Thus almost the entire French output—which only amounts to 4,000–5,000 tons annually—is made in the St Etienne area and at Le Creusot. Finally, as already mentioned, the regions with water power produce electric steel.

Iron and Steel Production by Variety, 1936 (*in thousand tons*)

Pig-iron		Steel	
Phosphoric (over 1 % phosphorus)	5,675	Acid Bessemer	39
Semi-phosphoric (0·12–1·0 % phosphorus)	63	Basic Bessemer	4,410
Haematite	329	Acid open hearth	31
Special irons (Spiegel, ferro-manganese, etc.)	163	Basic open hearth	1,918
		Crucible	5
		Electric	283
Total	6,230	Total	6,686

The relationship of the various processes and products of the iron and steel industries is illustrated in the annexed table.

(4) The working up of iron and steel into finished products is commonly termed engineering, though this in its widest sense embraces industries which use non-ferrous metals—copper, brass, zinc—as well as iron and steel, and many other diverse raw materials in addition. The location of specialized branches such as shipbuilding and marine engineering, locomotive building, automobile and aircraft manufacture is often traceable to definite geographical factors, whilst general engineering tends to be more ubiquitous in its distribution. Even so, the heavier branches tend to be located in areas where large fuel supplies for power are available, i.e. on the


Iron ore
Coal or coke
Limestone
Blast furnace
Foundry pig-iron
Steel-making pig
Forge pig
Cupola
Bessemer converter
Open-hearth furnace
Electric furnace
Puddling furnace
Iron castings
Pipes
Wrought iron
Steel ingots
Steel castings
Cogging mill
Steel billets, blooms, slabs
Forging press
Finishing mill
Wheels, Axles
Ship and locomotive plates
Sheets
Plates
Black plates
Rails
Angles
Girders
Wire rods
Galvanized sheets
Tin plates
Enamelled, pressed hollow ware
Wire
Wire netting
Wire nails

coalfields, where also generally speaking the main metallic raw materials are most easily obtained, whilst the lighter trades show a wider distribution corresponding mainly to the distribution of the major population centres which are their markets. Thus a map showing the location of all industries falling within the term 'engineering' would omit very few important towns in France (Fig. 74).

Iron Ore

Ores of iron are found in small quantities in the sedimentary rocks of most parts of France, and iron working and iron smelting have been carried on sporadically all over the country where wood was available for charcoal and water for the hammers. With the introduction of steam power, the main development of the industry took place on the northern coalfield, but a number of scattered industries survived on or near the small coalfields of the Central Massif, those of Le Creusot and St Etienne for example. To-day the local ores are either worked out or are unprofitable, but the industries based on them continue to exist by importing pig-iron and in some instances also coal. Some of the firms concerned are engaged in making armaments, and their survival, apart from industrial inertia, is due to an avoidance, for strategic reasons, of the frontier coal- and iron-fields. In other instances they have developed special interests, such as the making of crucible steel.

With the development after 1878 of the Gilchrist-Thomas process of steel making, the large-scale utilization of the phosphoric ores of Lorraine became the basis of the iron and steel industry of both France and Germany. The ore resources of France were doubled when she regained the Metz-Thionville portion of the ironfield after the war of 1914–18. The most recent estimate of the reserves puts the total at about 4,500 million tons, of which nearly 4,000 million tons lie in Lorraine, and almost all the remainder in Luxembourg. At the 1927 rate of extraction, it was estimated, exhaustion would be reached in from 60 to 100 years.

The annual production of the French iron mines has fluctuated greatly since the end of the 1914–18 war, in sympathy with the current political and economic situation (Fig. 69). In 1929, the peak year of post-war recovery, a total output of over 50 million tons was reached. The output dropped again, largely as a result of the world depression, but partly because Germany, the chief market for French ore, had turned increasingly to Sweden for supplies. The overwhelming preponderance of the Lorraine fields—Metz-Thionville in

Production of Iron Ore by Districts (in millions of metric tons)

District	1929	1933	1934	1935	1936	1937
Metz-Thionville	21·35	13·14	13·67	13·66	14·13	15·63
Briey	21·37	13·25	14·09	14·37	14·81	16·53
Longwy	3·78	1·63	1·83	1·69	1·68	2·26
Nancy	1·49	0·70	0·73	0·67	0·77	1·00
Normandy	1·88	1·32	1·42	1·39	1·52	1·94
Anjou-Brittany	0·53	0·16	0·22	0·23	0·25	0·38
Pyrenees	0·23	0·02	0·02	0·02	0·02	0·05
Others	0·08	0·02	0·01	0·01	0·02	0·03
Total	50·73	30·24	32·01	32·04	33·20	37·82

Iron and Steel Production by Departments, 1936

Region	Department	Chief localities	Output (thousand tons)	
			Pig-iron	Steel
Northern industrial area	Pas-de-Calais	Isbergues, Outreau, Hénin-Liétard	86	100
	Nord	Denain, Trith, Hautmont, Jeumont	755	1,075
	Aisne	St Quentin, Hirson	—	35
	Ardennes	Mohon, Flize, Signy	—	57
Lorraine	Moselle	Rombas, Hagondange, Knutange, Hayange, etc.	2,317	2,207
	Meurthe-et-Moselle	Nancy, Pont-à-Mousson, Auboué, Villerupt, Longwy, etc.	2,562	2,252
The Centre	Loire	St Etienne, Firminy, St Chamond	—	150
	Rhône	Givors	30	2
	Saône-et-Loire	Le Creusot	—	148
	Nièvre	Nevers, Imphy	—	18
	Allier	Montluçon, Commentry	19	28
	Puy-de-Dôme	Thiers	—	20
	Tarn	Albi	—	6
	Gard	Alès	—	4
Normandy	Calvados	Caen	267	264
	Seine-Inférieure	Rouen	39	1
The west and south-west	Morbihan	Hennebont	—	31
	Loire-Inférieure	Nantes, Trignac	—	64
	Landes	Boucau	47	24
Pyrenees	Ariège	Pamiers, Tarascon	—	4
Alps and Jura	Savoie	Ugine, Montricher, etc.	—	59
	Isère	Livet, Bonpertuis, etc.	66	10
	Doubs	Montbéliard	—	30
Paris	Seine	Paris	—	41
	Haute-Marne	St Dizier, Rougeant	—	47
All other areas			42	9
		Total	6,230	6,686

From *Statistique de l'Industrie Minérale, 1936* (Paris, 1938).

the Moselle department, Briey, Longwy and Nancy in the department of Meurthe-et-Moselle—is clear from the above table; the last three have regularly contributed about 52% of the total national production, whilst the Metz-Thionville region (in German hands between 1871 and 1918) produced most of the rest (42%).

The only other ironfield of any note is that of Normandy. Though insignificant in comparison with that of Lorraine, it is remarkable for the richness of its ore. In 1929 and again in 1937 its output approached 2 million tons.

The Lorraine Metallurgical Industry

In Lorraine the ore underlies the oolitic limestone plateau of Jurassic rocks between the rivers Meuse and Moselle. The plateau forms a rough triangle, nearly 100 km. long from the Luxembourg frontier to its apex near Nancy and about 40 km. wide in the north. It has a scarped edge facing east and north-east; the ore outcrops along this edge and dips gently west or south-west. The iron deposits lie in the Aalenian series of rocks which are sandwiched between the lower layers of the Middle Jurassic and the upper layers of the Lias and are thus almost exactly equivalent in age to the Northamptonshire ores in Britain. The tributaries of the Moselle traverse the plateau from west to east, trenching deeply as they cross the scarped edge. In these valleys, and along the scarped edge of the plateau, the ore is exposed and can be reached by adits driven into the valley sides (Plate 52). On the northern edge of the plateau the iron beds can even be quarried in a few places. Farther to the west, they dip down and the valleys are not deeply etched, so that the ore is reached only by deep shaft mining.

The most important characteristic of the Lorraine ores is that they are phosphoric and therefore had to wait for the invention of the Gilchrist-Thomas 'basic' process in 1878 for their full exploitation. The upper beds of red, sandy ores are very friable, do not stand transport well and are largely used to mix with other ores; they yield up to 40% of metallic iron. Below these comes the best 'Minette' ore, unfortunately largely worked out. This occurs on the northern edge of the Briey plateau. A less rich, yellow, calcareous ore is found between the valleys of the Algeringen and Orne. Below this again and much more widely distributed are grey, calcareous ores, having an iron content of only 38%, but occurring in relatively thick seams, varying from 2 to 6 m. Still deeper lie poor gravelly ores very little worked.

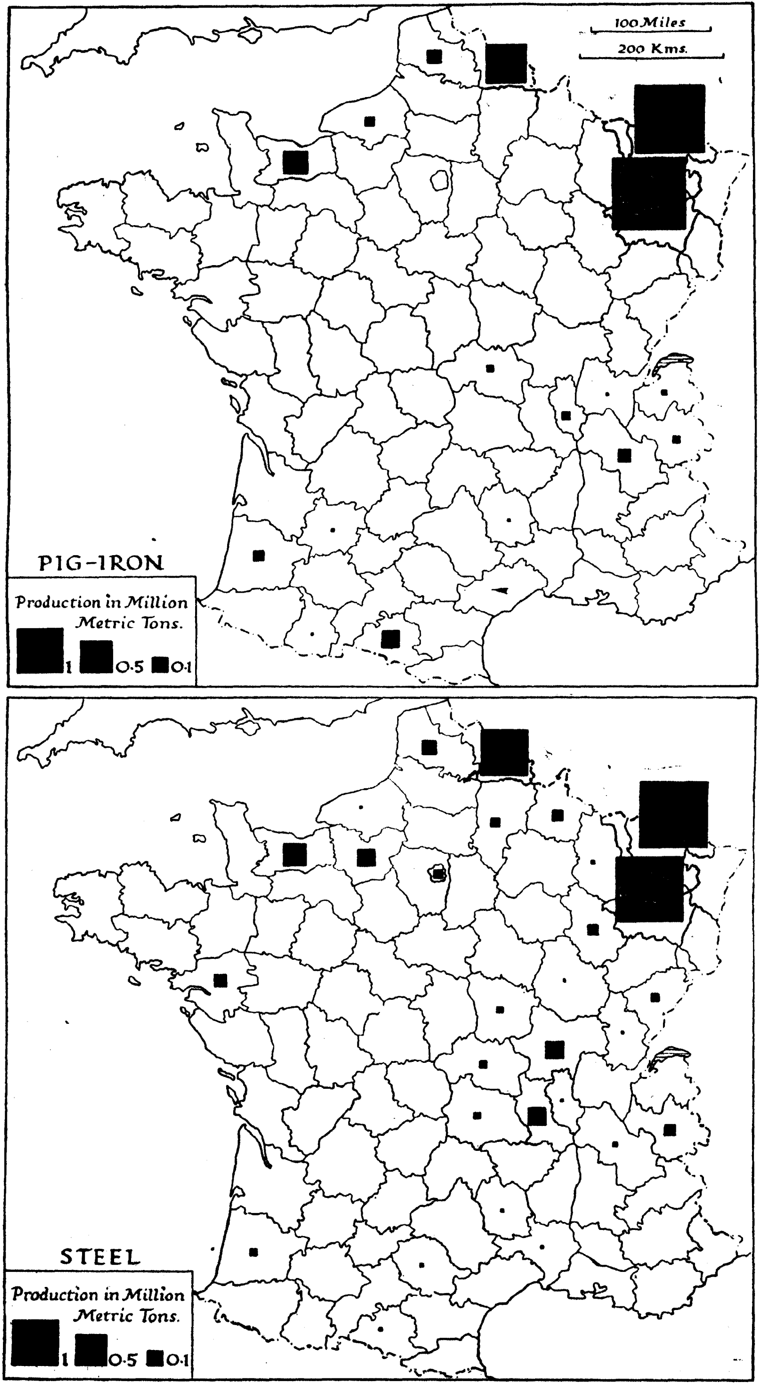

100 Miles
200 Kms.
PIG-IRON
Production in Million Metric Tons.
1
0·5
0·1
STEEL
Production in Million Metric Tons.
1
0·5
0·1

Fig. 70. Output of pig-iron and steel by departments, 1936

Based on *Statistique de l'Industrie Minérale, 1936* (Paris, 1938).

Although the ferruginous content of the Lorraine ores is not high, there are compensating factors that make the deposits very valuable. The dip of the strata is gentle and is very little disturbed by folding or faulting, so that mining is not costly, as it is, for example, with the rich Siegerland ores of Germany. The calcareous matrix makes the ores almost or quite self-fluxing, the siliceous ores of the Nancy region being an exception. Again, the Lorraine ores are porous and easily reduced, requiring a relatively small fuel consumption in smelting. The chief disability in the working of the ores is the relatively heavy cost of transport involved in bringing the ore to the fuel, or, conversely, the fuel to the ore. Communications are difficult in every direction (Fig. 71). The journey from the Westphalian coalfield is long and involves a steep ascent from the Rhine valley. Transport to the Franco-Belgian coalfield involves the crossing of the Ardennes. The Saar coalfield, which lies nearest, does not produce metallurgical coke without the addition of Westphalian or other coal. Furthermore, the field lies on the frontier between France

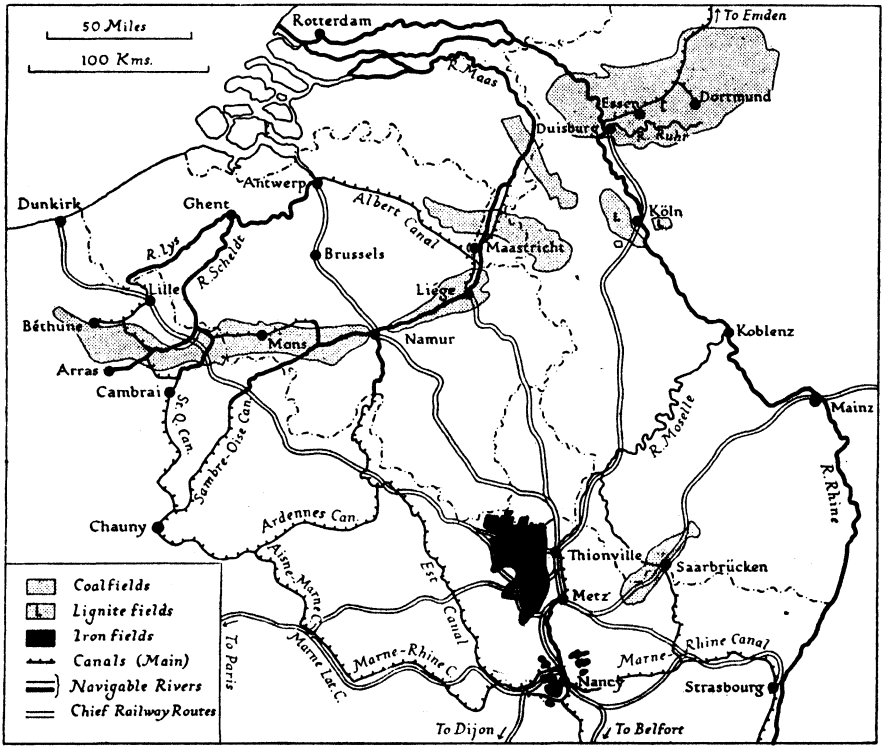


Fig. 71. Lorraine in relation to the coalfields and ports of north-western Europe. The main lines of rail and water transport are shown

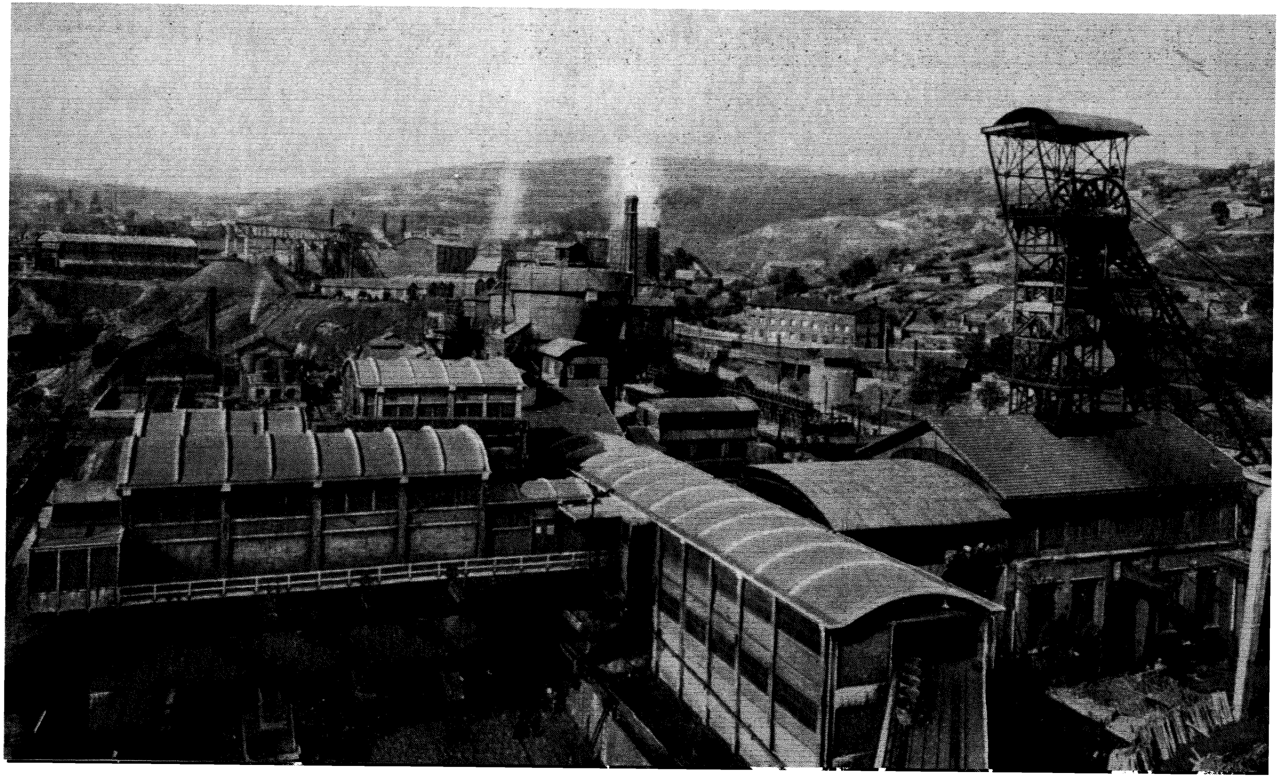


Plate 51. St Etienne

View of an industrial section of the town, with a large coal mine, showing pit-head gear, washing and screening plant, electric power station, and on the right a dump of pit-props; the whole is set on an undulating upland, just over 500 m. above sea level.

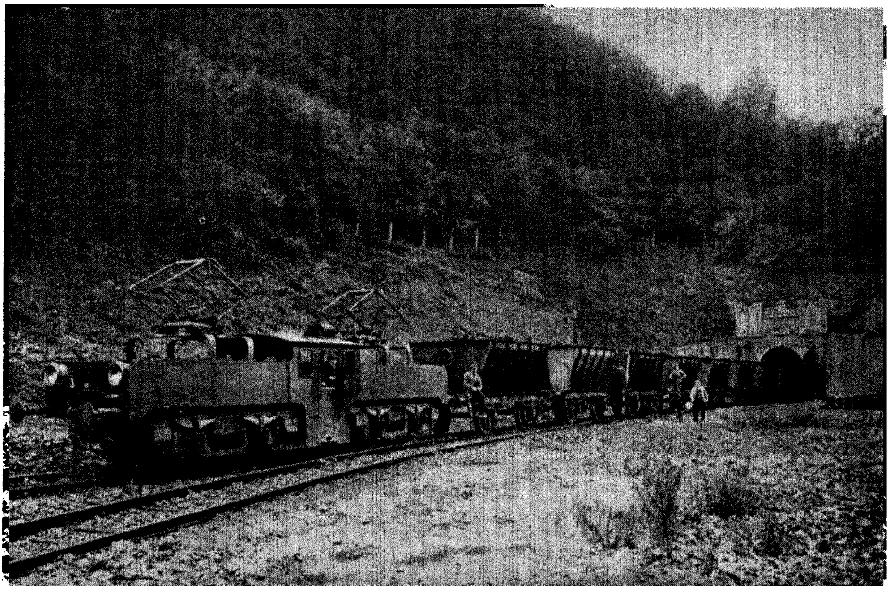


Plate 52. Iron mining in Lorraine

Entrance to an adit mine in the Fentsch valley near Hayange (see Fig. 72). The employment of electric haulage is general in the Lorraine mines.

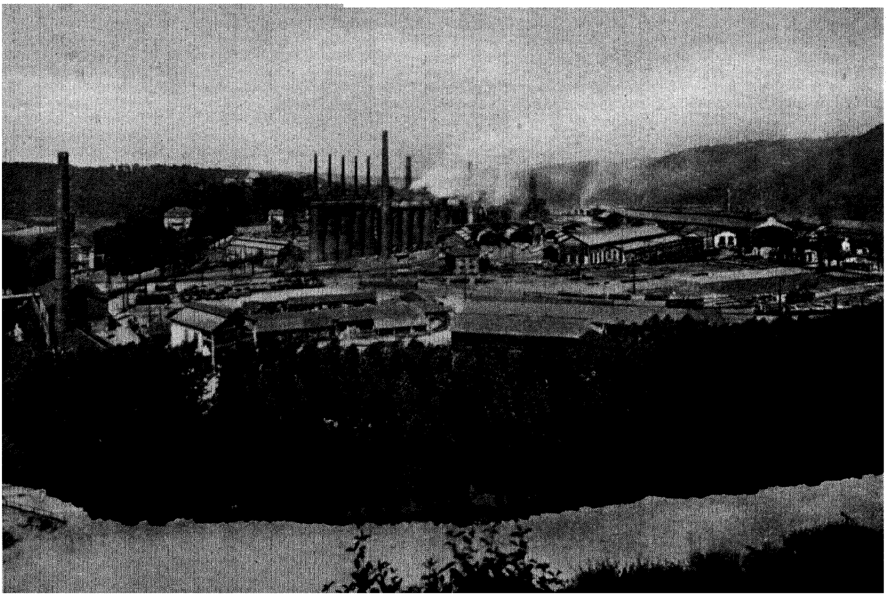


Plate 53. Iron and steel works at Joeuf

The works are situated on a flat terrace in the deep-cut meandering valley of the Orne between Homécourt and Moyeuvre (Fig. 72); the river is in the foreground. In the centre is a group of blast furnaces with their attendant hot-blast stoves; to the right are steel works and rolling mills.

and three foreign countries, and disorganization has followed war three times within living memory.

The Lorraine field is divided by faults and barren ground into four producing areas: that of Nancy in the south, Metz-Thionville in the north-east, both lying near the scarped edge of the plateau of Côtes de Moselle, that of Briey in the broader western part of the plateau itself, and that of Longwy in the north-west, overlapping into Luxembourg.

The Nancy region was the first to be exploited. Mining by adits takes place in the plateau edges overlooking the Moselle and in those of the outlying limestone massif covered by the Bois de Faulx. The ores of this area are unsuited to long-distance transport, for they are sandy and friable and the iron content is relatively low. Moreover, the ore is not self-fluxing as in the other areas, so that limestone or calcareous ore has to be brought in to smelt it. Ore is exported from Maxéville, the port of Nancy, by way of the Marne-Rhine Canal to Burbach in the Saar Territory. Local smelting takes place near the mines along the Moselle valley, served by rail and water transport, at Maxéville, Frouard and Pompey, and farther south on the Canal de l'Est at Neuves-Maisons; there is an outlying centre in the north, not near any mines, at Pont-à-Mousson. There is a tendency for a greater development in the Nancy region than elsewhere in Lorraine of the manufacture of finished iron and steel products and of engineering, e.g. iron pipes at Pont-à-Mousson, electric locomotives and other electrical equipment at Nancy.

The Metz-Thionville region. North of Pompey mining ceases for 30 km. until the recently developed area of Novéant-Ars-sur-Moselle is reached. Beyond the latter, there is no mining in the immediate neighbourhood of Metz, but the ore field begins again west of Maizières, 10 km. north of the fortress and continues along the scarp overlooking the Moselle valley to beyond Thionville. The bulk of the mining however is concentrated in the lower valleys of the Orne and Fentsch where adits penetrate the valley sides. The lower valleys of both streams are crowded with iron and steel works, coke ovens, miners' and metal-workers' villages (*cités*), roads and railway sidings. Much of the ore is moved by aerial rope-ways; some travels long distances in tunnels from valley to valley. In the Orne valley a long string of great works stretches from Auboué through Jœuf to Homécourt, and again lower down at Moyeuvre and Rombas (Plate 53). In the Fentsch valley there is a similar line from Knutange through Hayange to Florange. There are also several large works in the

Moselle plain, alongside the main railway line—at Maizières, Hagondange, Uckange and Thionville. Many of these works are highly integrated units, producing their own coke and using coke-oven and blast-furnace gases to generate electricity to drive the steel mills and to work the nearby mines.

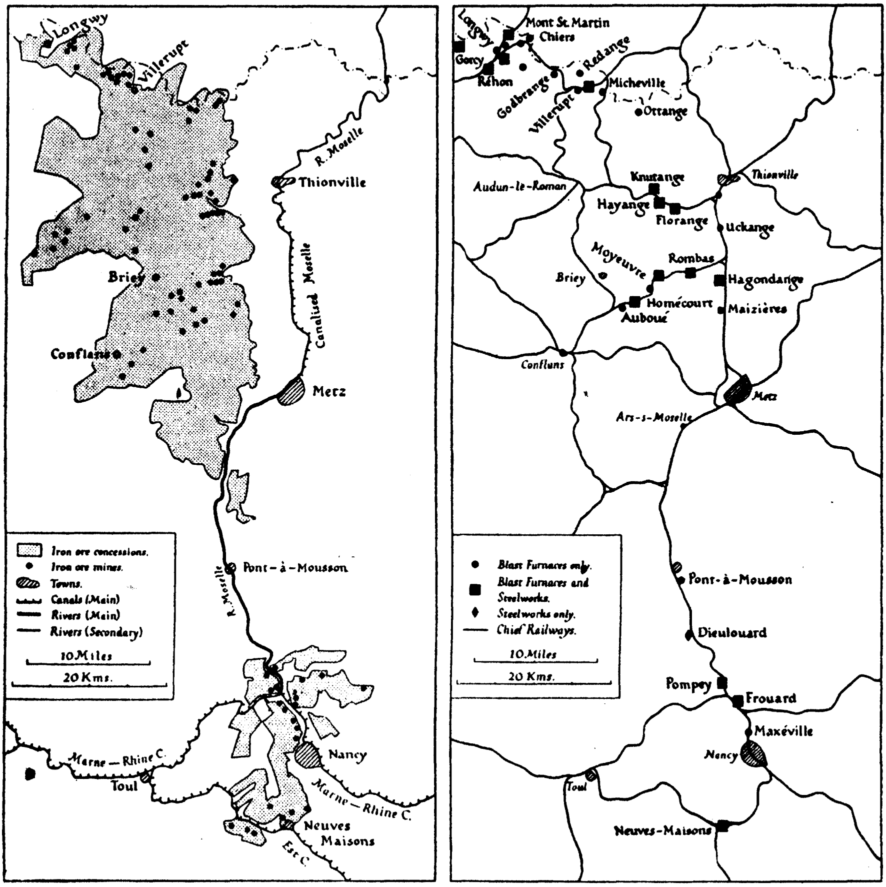


Fig. 72. Industrial Lorraine. Left: iron mining in relation to navigable waterways. Right: the iron and steel industry in relation to railways

Based on the *Carte Industrielle de la Lorraine* (Paris, 1930).

The most noteworthy differences between these maps and those of the northern industrial region (Fig. 66) are the virtual absence in Lorraine of steel works unaccompanied by blast furnaces, and the presence of numerous blast-furnace works which have no attached steel works. This difference in the economy of the industry in the two areas is a result of their different relations to ore and fuel supplies and to the engineering industries (cf. p. 202).

The Briey region consists of the plateau to the west of the Metz-Thionville area. The self-fluxing ores of this area are mined in the upper basins of the Orne and Fentsch, and in the upper valleys of the Crusnes basin which drains westward to the Meuse. Mining here is by shafts. Owing partly to difficulties of water supply and partly to those of transport, steel works have not developed on the plateau, and the ore is sent away to the Metz-Thionville district.

The Longwy region lies on the northern edge of the Briey plateau. The international boundary separating France from Belgium and Luxembourg passes along the escarpment on the face of which the ferruginous sandstone outcrops. Mining and metal working are carried on in the upper valleys of the Alzette and the Chiers. The mines are mainly worked by adits, but at Hussigny the ore is quarried in the open. Iron and steel works are crowded in the deep, narrow valleys along the railways. There are half a dozen, some of the most important in France, at the convergence of lines on Longwy-Bas in the Chiers valley, for the ores of this area are so sandy that they do not pay for transport and are smelted on the spot. A second group clusters around Villerupt in the upper Alzette valley.

External relations of Lorraine. Reorientation of the iron, as of the coal industry, of eastern France was greatly simplified by the international nature of the ownership and organization of the Lorraine industries, in which French, Belgian, Luxembourg and German interests were all represented. In spite of transport difficulties, which have always been a serious problem in the working of the ironfield, whether in German or French hands, and in spite also of the decline in the Ruhr-Lorraine interchange of coke and iron after 1918, the export of French ore and pig-iron was already recovering by 1929. In the years 1934–8 the export of pig-iron averaged 6 million tons. During the period 1928–33 Germany imported from France an annual average of 2 million tons of pig-iron, a figure which rose in the years 1934–8 to 6 millions. In the boom years of 1928–30, one-third of the French ore output was exported. From 1933 onwards exports rose owing to the decreased home demand, reaching 19·32 million tons in 1937. Belgium has always been the largest customer for Lorraine ores, taking an average in recent years of 10 million tons. Four-fifths of these imports into Belgium emanated from Belgian-owned mines in Lorraine.

The Northern Region

The iron and steel industry of northern France is based on the fuel supplies of the local coalfield, and is entirely dependent for raw material on ore and metal imported into the area. As a result, pig-iron is not produced in very large quantities—the average for 1932–8 was less than 0·8 million tons. The steel industry, on the other hand, had grown to considerable dimensions by 1913, and since 1918 has in general maintained a production of between a million and a million and a half tons. Ore and pig-iron are imported from Lorraine, Luxembourg, Sweden and Spain, while some comes coastwise from the Norman ironfield and the smelting works of Caen to the port of Dunkirk. The local metal-using and engineering industries provide abundant scrap for remelting in the open-hearth steel furnaces. In contrast with the Lorraine industry, there are no blast-furnace plants in this area unaccompanied by steelworks, whilst there are a number of steel works which, depending on imported pig-iron and scrap, have no blast furnaces attached. A further contrast lies in the very considerable development in this coalfield region of the manufacture of iron and steel products and of heavy and light engineering industries.

On the coalfield itself, the chief area for iron and steel production centres upon Valenciennes (see Fig. 66). This is the Anzin-Trith-Denain group of works which lies along the canalized Scheldt. Here, in addition to smelting and steel making, both heavy and light engineering is carried on: locomotives, boilers, rails, agricultural and textile machinery. Rail communications are good, coking coal is produced locally, and there are ready markets in Belgium and in the Lille area for semi-finished iron and steel products and machinery. A second, less concentrated industrial area lies between Douai and Lens (see Fig. 73), with steel works at Hénin-Liétard and engineering and wire drawing at Douai.

Off the actual coalfield are two other industrial centres. The Sambre valley south-east of Valenciennes is entirely industrialized. Iron and steel production takes place at Hautmont and Louvroil, and here and at Aulnoye, Maubeuge and Jeumont there are numerous heavy and light engineering industries, including locomotive and rolling stock building, boiler making, metal stamping and cutting, the manufacture of iron and steel tubes, nuts and bolts and machine tools. The engineering industries of the Lille area are also considerable; textile and agricultural machinery is made, as well as electric motors and railway rolling stock. Fives and Hellemmes, industrial suburbs on the eastern side of the city, have boiler and locomotive works and metal stamping mills.

Outlying centres of iron and steel production are Isbergues, on the Aire Canal, and Outreau (Boulogne).

Other Areas

The Ardennes. In the department of Ardennes, almost exactly equidistant from Valenciennes, from Longwy, and from Namur, are a number of steel works, metal-using and engineering factories strung out along the meandering river Meuse from its junction with the Chiers above Sédan to the Belgian frontier at Givet, a distance (following the navigable waterway) of just over 100 km. Industry began in the valley on a basis of water power, and it survived by reason of the relatively easy access by water and rail to the Sambre-

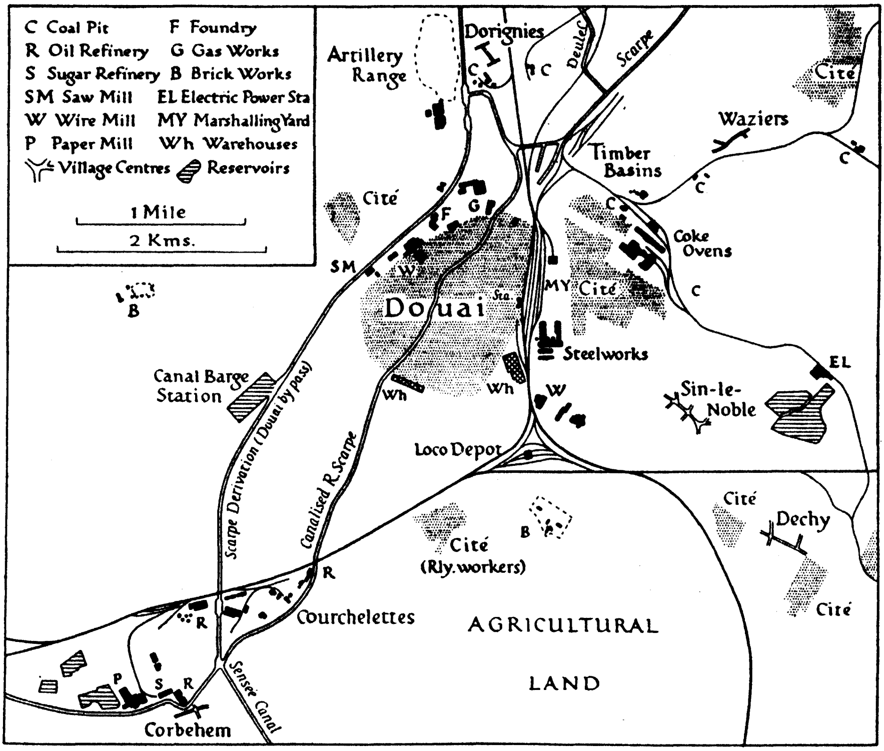


Fig. 73. Industrial Douai

Based on G.S.G.S. 1 : 25,000, series 4041, sheet 74 SE.

This map presents a sample of the industrial landscape of the northern coalfield, comprising towns and villages with factories and coal mines in a rural and agricultural setting. The influence of waterways on industrial location is obvious; the map also shows the typical canal basin where barges can be marshalled to await traffic, and the timber basins where pit-props are assembled and distributed. The canals and rivers also supply industrial water and carry off waste. Collieries, often with coke ovens, are usually linked by private railways to the main lines and waterways. The new *cités* (see also Plate 50) are quite distinct in their appearance and layout from the old villages at cross-roads.

Meuse coalfield of Belgium and to supplies of ore, and more especially of metal, from Lorraine. There are steel works at Flize, Mohon (a suburb of Mézières) and Vireux, and many foundries, metal-stamping mills and factories making mainly small goods such as hardware, nails, steel strip and wire, at Charleville, Nouzonville, Monthermé, Fumay and other smaller places.

The Central region. The iron and steel industries and their derivatives in central France are scattered on and near the small coalfields of the Massif. Generally, these industries depended originally on local ores, no longer worked. Their survival may be attributed to the development of steam power in the small coalfields, to the growth of the great urban centre of Lyons, to the modern development of hydro-electric power, to the cheap labour offered by the isolated highland communities and, not least, to the political necessity of stimulating the growth of vital national industries as far as possible from the north-eastern frontiers. The devastation of the northern and eastern industrial areas during the war of 1914–18 gave a new importance to the industries of the central region. Reconstruction caused an ebb in their war-stimulated activities, but anticipation of a future war prevented a complete return to pre-1914 conditions.

The iron and steel industries of the St Etienne and Le Creusot districts obtain pig-iron from Lorraine, and in addition are supplied by locally smelted iron and by scrap derived from the local engineering industries. The specialized character of the metallurgical work is indicated by the high proportion of the steel output (49% in 1936) classed as 'special', consisting of alloy steels used mainly in the armaments business. The St Etienne region produces good metallurgical coke (cf. table on p. 180). Engineering industries include the manufacture of armaments, cycles and motor-car parts, tools, nuts and bolts and other light metal articles, as well as textile machinery and aeroplane engines. The Gier valley is industrialized almost throughout its length from its junction with the Rhône at Givors to St Chamond, and the coalfield industrial belt extends south-westwards across the Rhône-Loire watershed through St Etienne to Firminy. There are several large steel and engineering works which make guns and heavy machinery, while Givors has blast furnaces and locomotive works. In 1936 the departments of Loire and Rhône produced 30,000 tons of pig-iron, 38,000 tons of ordinary steel and 114,000 tons of special steels, including almost the whole French output (about 4,000 tons) of crucible steel.

Farther north, Le Creusot, drawing its iron ore originally from the Jurassic rocks of Berry, no longer makes pig-iron, but depends on coal from Blanzy and Montceau-les-Mines, on coke from St Etienne, on pig-iron mainly from Lorraine, and on scrap from the local engineering works. The great Schneider works contains one of the largest steel-making plants in Europe—it produced almost 150,000 tons in 1936—and extensive armaments and locomotive factories. The town nestles amongst hills, 350 m. above sea level, almost on the Saône-Loire watershed; it is connected by rail and canal with Chalon-sur-Saône and with the upper Loire valley at Digoin.

Isolated centres of metal-using industry within the Central Massif include Thiers, in the Limagne basin, with an old-established cutlery industry, Clermont-Ferrand, of much later development, with light engineering connected with railways and mining. Farther west, in the basin of the upper Cher, are Montluçon and Commentry. These metal-working centres have grown rapidly, favoured by their easy contact with Paris and by access to the Commentry coalfield. The towns are served by the Berry Canal and import pig-iron from Lorraine. There are armament factories and iron-pipe works. Small quantities of pig-iron are made from pyrites and other ores. In 1936, the department of Allier produced 19,000 tons of pig-iron and 27,800 tons of steel.

Out on the plain to the north of the Massif, where the Loire and Allier emerge from the highland, the ores of Berry and the coal of Décize were responsible for the founding of the metallurgical industries of the Nevers district, which now depend on Le Creusot coal and Lorraine iron. There are steel works at Imphy, engineering works including railway rolling stock at Nevers, and other miscellaneous steel-using industries at Fourchambault. Falling within the same metal-working province are Bourges and Vierzon, the former with foundries, ordnance works and more recently aircraft factories, the latter manufacturing agricultural machinery.

Finally, the tally of scattered iron and steel industries in central France is completed with mention of the isolated steel works, with associated engineering industries, at Alès and Decazeville, which are clearly located with reference to fuel supplies.

The Norman Iron Industry. The iron ores of Normandy, Anjou and Maine occur along the edge of the Armorican Massif. For the most part they have been deposited by iron-bearing waters percolating through from overlying ferruginous rocks which are now mostly worn away. In Normandy the ore is mined within the massif, in

Silurian shales; at Falaise, in Maine, it occurs in a Liassic limestone; in Anjou it is worked in the sandstones of the basin of Pouance-Segré. Where erosion of overlying beds of limestone has exposed the ores at the surface, iron carbonates have been converted into iron oxides—haematite; elsewhere the ore is calcareous. In general it is of the granular 'minette' type, and is phosphoric, but is richer than that of Lorraine, having an iron content of 44–54%. The first blast furnaces were erected in 1914; previously to this the ore was worked for export to England and Germany and to supply other French smelting plants. From the Norman fields the ore was railed to Denain and Isbergues in the north; from the southern mines it travelled to the lower Loire furnaces. In 1914 a German firm was about to begin smelting at Mondeville, near Caen, when war broke out and the coke ovens and blast furnaces were taken over by a French company. Pig-iron was first exported from Caen in 1919.

In recent years between 1½ and 2 million tons of ore have been produced in this region, of which about one-third has been used in the local furnaces, and the remainder sent coastwise to the northern coalfield or exported to Britain. In 1936 the output of ore amounted to 1·277 million tons, of which 0·757 million tons was consumed in France (0·555 million tons locally), leaving 0·520 million tons for export. Engineering industries in the area include shipbuilding yards and sea-plane works at Blainville (p. 210), and an aeronautic works at Carpiquet, 7 km. to the west of Caen. The port for the area is at Hérouville on the Caen Canal.

The Western region. In western France iron and steel industries are confined to the ports, where they are localized partly by the ease of importing ore, metal and fuel and partly by the requirements of the shipbuilding industry (cf. p. 210). The most important area is the lower Loire. Nantes, with its improved navigation facilities, has developed important metallurgical works, and makes steel castings for naval construction. Basse-Indre, a few miles down the estuary, on the right bank, also has steel works, while Trignac, north of St Nazaire, has a complete plant of coking ovens, smelting and steel works. It makes sheet iron and steel plates for naval construction and guns which go to the yards and arsenals of St Nazaire, Nantes, Brest, and Lorient. There are numerous other steel-using industries in the lower Loire towns, including tinplate manufacture, and Nantes has important locomotive building works.

Iron ore for the smelting works came originally from the Pouance-Segré basin of Brittany-Anjou, and later from Spain and Sweden.

Coal and coke for the iron and steel industries are obtained coastwise from northern France, and steam-coal from south Wales.

An outlying centre of iron and steel manufacture, depending entirely on imported ores and fuel, is Boucau, at the mouth of the Adour river near Bayonne.

Alps and Pyrenees. In these areas development of late years has kept pace with that of hydro-electric power and the use of the electric steel furnace. The production of electric steel in France advanced from 27,000 tons in 1913 to 306,000 tons in 1938, representing in the latter year about 4·2% of the total output. About one-quarter of this amount was produced in the Alpine and Pyrenean departments. Although the raw material, in the shape of pig-iron and scrap, is bulky, it enters almost wholly into the finished product, with little waste, and the localizing factor is therefore the source of high-voltage electric current which it is inconvenient to transmit over long distances in accidented mountain country. Accordingly, the steel works lie in close proximity to the power stations (Plate 54).

In the Pyrenees, small quantities of haematite ore are mined, mainly in the upper Ariège and Garonne valleys; the reserves are not great however, and output declined from 370,000 tons in 1913 to 27,000 tons in 1936, the bulk of which emanated from the department of Pyrénées Orientales. Small quantities of the ore are fed into the electric steel furnaces, together with much larger quantities of pig-iron and scrap imported into the district. The works are situated at Pamiers and Tarascon, in the department of Ariège.

In the Alps, the output is on a rather larger scale, and in addition to special electric steels there is some production of ferro-alloys which are used in ordinary steel making (ferro-silicon, ferro-manganese, etc.). About ten works are engaged, mostly in the region of the upper Isère and Arc valleys, e.g. Ugine, Venthon, and Montricher, with an important one farther west at Bonpertuis, north-west of Grenoble. The latter town is the only significant locality having any metal-using industries; there are foundries and factories which manufacture electrical apparatus.

SHIPBUILDING

The shipbuilding industry in France has always been on a small scale compared with that of other countries, yet it has a large permanent excess capacity. During the 25 years ending in 1938, and excluding the years 1914–19, it was only in seven years that the output exceeded 5% of the world total, usually by a small margin only: when it reached 12% in 1932, the world output was the second lowest since 1909. During this period the maximum French output, in 1921, amounted to 210,000 tons, barely 5% of the world output. The fact is surprising, for the shipbuilding industry is not generally suited to mass production methods, and would therefore appear appropriate to French industrial and engineering capabilities.

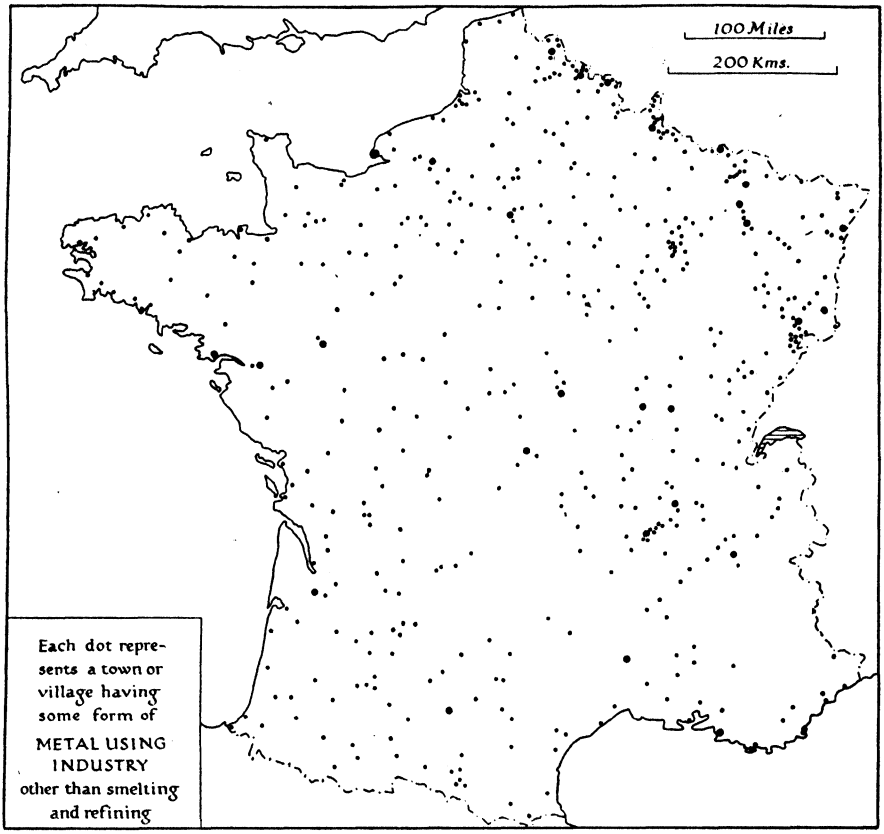

100 Miles
200 Kms.
Each dot represents a town or village having some form of METAL USING INDUSTRY other than smelting and refining

Fig. 74. Distribution of metal-using industries

Based on the *Atlas de France*, Plate 48 (Paris, 1933).

Both ferrous and non-ferrous metals are included, and the industries comprise forges, foundries, rolling and stamping mills, the fabrication of all kinds of metal goods and machinery, constructional, locomotive, electrical and other forms of engineering. The more important individual centres are shown by larger dots.

During the period 1921–6 the output grew as construction was needed to replace war losses, but afterwards declined considerably. French builders cannot compete with foreign builders; in recent years the government adopted a programme of subsidies for shipbuilding, but less thoroughly than others. The output remained relatively high when world output fell to a record low level, but declined considerably as world output recovered. Subsidies have not even encouraged an adequate replacement of old tonnage. Tariff reductions were allowed on imported ships since 1936, and in recent years the government set up the Crédit Maritime, a system of subsidies to make good in part the difference between French and foreign building prices, whilst early in 1939 an additional grant was offered to encourage the construction of special types of ships, e.g. refrigerator vessels and cargo or passenger liners. Later in 1939 the subsidy was extended to cover orders placed abroad, as many yards were occupied with naval construction. In 1938, for example, Denmark was building five ships on French account, and Great Britain four. In the same year, out of a total world launch of 1,119 ships of 3,033,000 gross tons, 246 of 833,000 tons were ordered for customers outside the countries building them; of these Great Britain launched 56, Holland 53, Germany 47, Sweden 23, and Denmark 19, but France was the only important shipbuilding country in the world not building ships for foreign customers.

Shipbuilding Output, 1930–8

Year	World		France		Percentage of world output
	Number of vessels	Gross tonnage (000's)	Number of vessels	Gross tonnage (000's)	
1930	1,084	2889·5	18	100·9	3·4
1931	596	1617·1	22	103·4	6·3
1932	307	726·6	23	89·3	12·3
1933	330	489·0	29	34·0	6·9
1934	536	967·4	10	15·9	1·6
1935	649	1302·0	10	42·8	3·3
1936	999	2117·9	17	39·2	1·9
1937	1,101	2690·6	9	26·5	0·9
1938	1,119	3033·6	7	47·3	1·5

The French merchant fleet contains a larger proportion of fairly modern vessels than might be expected from the foregoing account: in 1938 28 % of her ships were less than 10 years old when the average figure for world shipping was 26 %. This was due to the fact that France has a relatively small tramp fleet and assistance to shipbuilding has been effective mainly for the liner fleet. The tramp class includes very few motor ships, and only about 15 % of the fleet is less than 10 years old. Furthermore, governmental encouragement of shipping has been very effective in the colonial trade; French vessels carry 97% of the colonial trade but only 40% of the foreign sea-borne trade.

The advertised figure for total annual construction capacity of the French yards, about 900,000 tons, has little relation to actual output, as the above table demonstrates; a varying amount of this capacity is occupied with naval construction; some yards are not in a state of efficiency; and inevitably every yard is not suitable for building every type of ship. The actual output, in fact, has never exceeded a quarter of the potential capacity. Of the fifteen firms of any size engaged in the industry, four account for two-thirds of the capacity—a greater concentration than occurs in Great Britain.

There are four main centres of ship construction, the Seine and Loire estuaries being the most important. The Loire yards are best known: the largest ships are built at St Nazaire, but the yards at Nantes have a considerable capacity also. The industry on the Seine estuary, while mainly located at the mouth (at Havre and at Graville and Harfleur adjoining), has also important yards higher up at Le Trait and at Grand Quevilly near Rouen, as far from the sea as any in Europe. Important secondary centres are on the Gironde just below Bordeaux, and on the Mediterranean, where the sheltered water of the Toulon roadstead offers a favourable position to the principal yards at La Seyne; smaller yards lie on either side of Marseilles at La Ciotat and Port-de-Bouc. A few yards are situated at Dunkirk and at Blainville, near Caen, while there are important naval yards at Lorient and Brest. Since France has no important steel-making centres near the sea, the location of her shipbuilding industries appears to be related mainly to the distribution of suitable launching water, a location, furthermore, best placed in a strategic sense.

The marine engineering industry, however, has a very different distribution, and it is not so closely related to the centres of hull construction as its counterpart in Great Britain; it is clearly less dependent upon natural factors of location or the supply of steel. Two centres are dominant. The Loire estuary possesses a quarter of the total marine engine capacity, and is thus the leading centre of shipbuilding as a whole: the engine works at Nantes are larger than those at St Nazaire. The second important centre is St Denis near Paris, where there are turbine works affiliated to the leading shipyard as well as a large Diesel-engine plant. Marseilles, although it does not build ships, is the third centre in engine-building capacity.

Smaller establishments lie at Cherbourg, Havre, Dunkirk, Bordeaux, and at the naval base of Brest.

LOCOMOTIVE AND ROLLING STOCK BUILDING

The building of railway locomotives and coaching stock is a specialized branch of constructional and mechanical engineering, which began in France about 1840, when the railway was making its début, and has attained a considerable national and international importance. Contrary to the general practice in Britain, the French railway companies have built but a small proportion of their own locomotives, and although they have large repair works at various localities (see Vol. IV, Ch. IV), new stock has been provided mainly or entirely by engineering firms in different parts of the country. In recent years only the Est works at Epernay and the Nord works at Hellemmes (Lille) and La Chapelle (Paris) have engaged in building. The bulk of the industry is quite naturally attached to the coalfield engineering regions where fuel for foundries and for power is most easily available, and also iron and steel. Since a large proportion of the raw material however—iron, steel, non-ferrous metals, timber, etc.—enters into the finished articles, and since the engines, coaches and wagons are capable of being sent away by rail on their own wheels, the industry is to be found also in odd corners of the country, where it either grew up very early and has remained by sheer momentum (as in Alsace), or has been localized by cheap power (as in the Pyrenees).

The northern coalfield contains some of the most important centres. Lille, Denain and Blanc-Misseron are the chief builders of steam locomotives in this region, whilst other centres, dealing also with coaches and wagons and electric rolling stock, are Jeumont, Raismes (near Valenciennes), Maubeuge and Douai.

On and near the central coalfields, the chief centre is the great Schneider works at Le Creusot, and there are others at St Chamond (near St Etienne) and Givors (near Lyons). In the east, the industry is dominated by the *Société Alsacienne*, which is one of the largest organizations of its kind in Europe, with works at Graffenstaden (near Strasbourg), Mulhouse and Belfort; there are smaller establishments, dealing mainly in coaching stock and electric vehicles, at Niederbronn in Alsace, and at Lunéville and Nancy in Lorraine.

Paris has several works, mainly for coach and wagon building and light railway locomotives, in the northern and north-eastern suburbs —St Ouen, St Denis and Corneuve. Of the outlying centres, the most important are Nantes, whither the Batignolles locomotive works in Paris were removed in 1921, Bagnères-de-Bigorre, in the Pyrenees, which builds coaching stock, and Clermont-Ferrand, which builds 'Michelin' railcars.

AIRCRAFT MANUFACTURE

This industry is of course of quite recent development; nevertheless, it has undergone a considerable reshuffling within the last decade. In 1931 a first step was taken, for strategic reasons, in the decentralization of the industry. Certain factories were removed to a prescribed zone and their owners compensated. This zone covered the west and west centre of France, between a line drawn through Granville, Le Mans, Orléans, St Etienne, Privas and Nîmes, and a line drawn parallel to and 40 km. distant from the coast. Later, twenty-four factories were organized under a form of nationalization; these comprised seven remaining in Paris and seventeen new, enlarged or transferred factories in the west, centre and south. These factories, which were to produce aircraft in series, were organized into six groups; for administrative purposes those of the west, south-west, centre and south-east included plants at Paris as well as the regional plants, while those of the north and Midi consisted only of regional factories. There were, further, fifteen important independent factories, of which ten were in Paris. Thus, of the thirty-nine important establishments, eighteen were situated in Paris and twenty-one in the rest of the country. Many smaller firms remained in the Paris region, together with the majority of component manufacturers (see Fig. 35). In 1938 certain aero-engine works were transferred to such centres as Tarbes, Le Mans and Nevers.

NON-FERROUS METALS

Except for bauxite, the ore of aluminium, France is very poor in non-ferrous metals; neither is there any considerable import of ores or half-smelted metal. There is, in fact, nothing in France corresponding to the great copper and brass industries of Birmingham, for example. For the most part metal production takes place at a small number of factories, situated either on the coalfields or at the ports. Much metal is imported for use in the engineering industries, from Belgium especially, which supplies France with a large proportion of its copper, lead and zinc.

Two factories, one at L'Estaque near Marseilles and the other at Couëron near Nantes, smelt 80 % of the lead output, from imported ores. Three factories produce almost all the zinc; two are located on the Haute-Deule Canal near Douai—at Auby and Noyelles—and the third and largest at Viviez, on the Decazeville coalfield. The only nickel works of note is at Havre; it refines metal imported from New Caledonia.

Manganese, so essential to the basic steel industry, is not produced at all in France, and the supplies—about half a million tons a year—are imported from Russia and from British India.

The following table shows the general situation in the production of non-ferrous metals other than aluminium:

Substance	Av. annual consumption ('000 tons)	Percentage home produced	Sources of import
Copper ore	Nil	Nil	
Copper metal	115	1	U.S.A., Belgium, Chile, U.K., Canada
Lead ore (metal content)	12	33	Belgium, Mexico, Tunis
Lead metal	100	13	
Zinc ore (metal content)	60	2	Belgium, Norway, Indo-China, Spain, Mexico
Zinc metal	100	60	
Tin ore (metal content)	0·5	Nil	U.K., Malaya, Belgium, Netherlands, N.E.I.
Tin metal	10	5	
Nickel ore	Nil	Nil	
Nickel metal	6	70	New Caledonia, Belgium, U.K.

From *Statistique de l'Industrie Minérale, 1936* (Paris, 1938).

Aluminium

Alumina is almost ubiquitous, being the principal constituent of clays, shales, slates and many other rocks, but the commercial ore of aluminium, known as bauxite, is relatively rare. France is one of the few countries of Europe possessing an exportable surplus—the others being Yugoslavia, Hungary and Italy—but reserves are estimated at about 60 million tons, sufficient only for 85 years at the present rate of extraction. The name bauxite is derived from the village of Baux, a few kilometres north-east of Arles, where the earth was first exploited, but the main source to-day, providing over 80 % of the output, is in the valley of the Argens, in the department of Var, within a radius of about 25 km. of Brignoles. Smaller quantities are produced in the departments of Hérault (about 11 %), Basses-Pyrénées, Lozère and Cantal. The essential content of bauxite is oxide of alumina, the red colour of the earth being due to staining by iron oxide. The ore is first reduced for the extraction of the alumina. About four-fifths of the bauxite retained in France is thus used—86 % in 1936—the remainder being employed in the manufacture of quick-setting cement and of refractory bricks. The production of alumina takes place in the neighbourhood of the bauxite beds, in the department of Bouches-du-Rhône—at Marseilles and Gardanne—where there are convenient deposits of lignite in the Fuveau basin. Considerable quantities of bauxite are exported, mainly to Great Britain (Burntisland) and Northern Ireland (Larne) and to Germany. In 1936 the amount exported was roughly 300,000 tons, about 47 % of the output (Fig. 75).

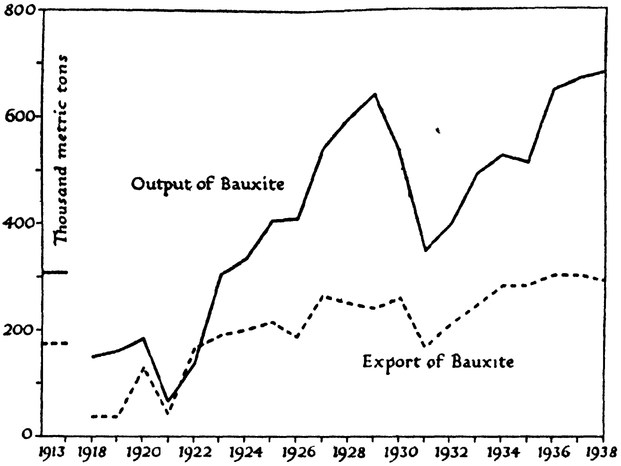


Fig. 75. Output and export of bauxite, 1913, 1918–38

Although the output has expanded considerably during the last twenty years, the export has not, for concessions to exporters were strictly limited.

The alumina is smelted with the use of cryolite as a catalytic agent, in an electric furnace, because great heat is required for the extraction of the metal. For this process the alumina is sent to the Alpine valleys where hydro-electric power is available. There are about a dozen works, chiefly in the departments of Savoie and Isère (Fig. 79). In Savoie the upper Arc and Isère valleys have works attached to the great power stations, and there are similar establishments in the Grésivaudan (middle Isère) valley above Grenoble, in Isère. The total is made up by a few isolated plants in the Alpine region, together with two or three in the Pyrenees, in the upper Ariège basin at Auzat and Sabart.

There is little or no employment of the metallic aluminium locally in the Alps. Fortunately, the metal is very light, so that the cost of its transport to the centres of the aircraft and motor industries in which it is chiefly used is not a serious hindrance.

ELECTRICITY

The production of electricity in France was not, until recent years, a matter of planning, but grew up haphazard and as demand increased. The state, however, has encouraged the wide distribution of electricity throughout the countryside in accordance with the policy of checking the drift of population to the towns. Of the communes of France 96% are now supplied with current.

France produces almost the whole of the electricity consumed within the country, though Switzerland contributes slightly to the needs of the east and north-east. Production is based almost entirely on steam and water power. Of the total installed capacity of 8·5 million kW., 5·7 million kW. is thermal and 2·8 millions hydraulic; the output of the hydraulic stations, however, is greater than that of the thermal stations (Fig. 76). Thermal generation usually employs coal, but in the north and in Lorraine there is some use of blast-furnace and coke-oven gases for the purpose; a negligible quantity of current is generated by Diesel engines using heavy oil.

Thermal electricity. The thermal generating stations, as may be expected, are situated for the most part on the coalfields—on the main coalfield of the north, on the Moselle coalfield and on all the small fields of the Central Massif (Fig. 78, cf. Fig. 65). Isolated coalfields that contribute are Ronchamp in the south-west Vosges and La Mure in the department of Isère. At Hostens in Gironde and at Fuveau in Bouches-du-Rhône, lignite deposits are used. Blast-furnace gas for generating electricity is used chiefly in Lorraine, and also at the Mondeville works near Caen. At the large sea and river ports electric stations use steam power raised from imported coal.

Within the areas mentioned, the local siting of the power stations is often determined by access to water. For example, Paris, Lyons, Rouen, Strasbourg and Lille have stations situated on important waterways—for a large thermal station not in close proximity to a coal mine must be in a position to obtain coal cheaply by water; and in any case there must be ample water for cooling and a watercourse to carry away condensation water (Plate 57).

The installation of thermal electrical stations on the coalfields and in the regions of metallurgical industry is also due to the increased demand for electric power in the mining and metallurgical industries. Extractive machinery is now all electric, and so, for the most part, is that of the steel works. In fact the bulk of factory machine equipment is now electric. What were formerly waste products—coal slack, inferior coal, coke-oven gas and blast-furnace gas—are used to generate electricity and utilized in the industry itself. Any surplus current is sold to electricity-distributing enterprises. Of the installed thermal electric power of France, 30% is to be found in the mining and metallurgical centres. In Paris, however, which has twelve plants with a total installed capacity of 1,723,000 kW., are to be found the most powerful stations in the country (see Figs. 77 and 78). These are all thermal stations, situated on the banks of the Seine.

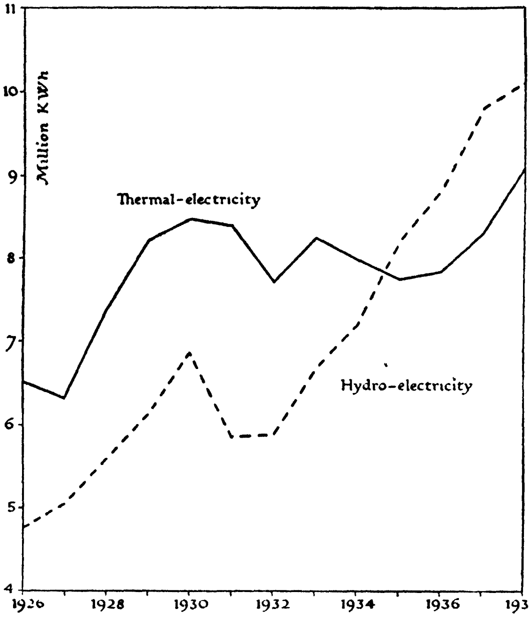


Fig. 76. Output of electric current, 1926–38

Based on successive *Annuaires Statistiques* (Paris).

Although the installed capacity of thermal installations is more than twice that of hydraulic plants, the output of current by the latter is now greater than by the former. The hydraulic plants have for the most part a higher percentage relation of output to capacity than the thermal stations. The increasing cost of coal has led to an increased dependence upon water power; moreover, many of the thermal stations are used simply as supplementary sources of supply at times of low water when the output of the hydraulic stations is at a minimum, or as reserve plants which can be called upon as occasion demands. Thus the Paris area alone has several stations which have been almost or quite disused for some years.

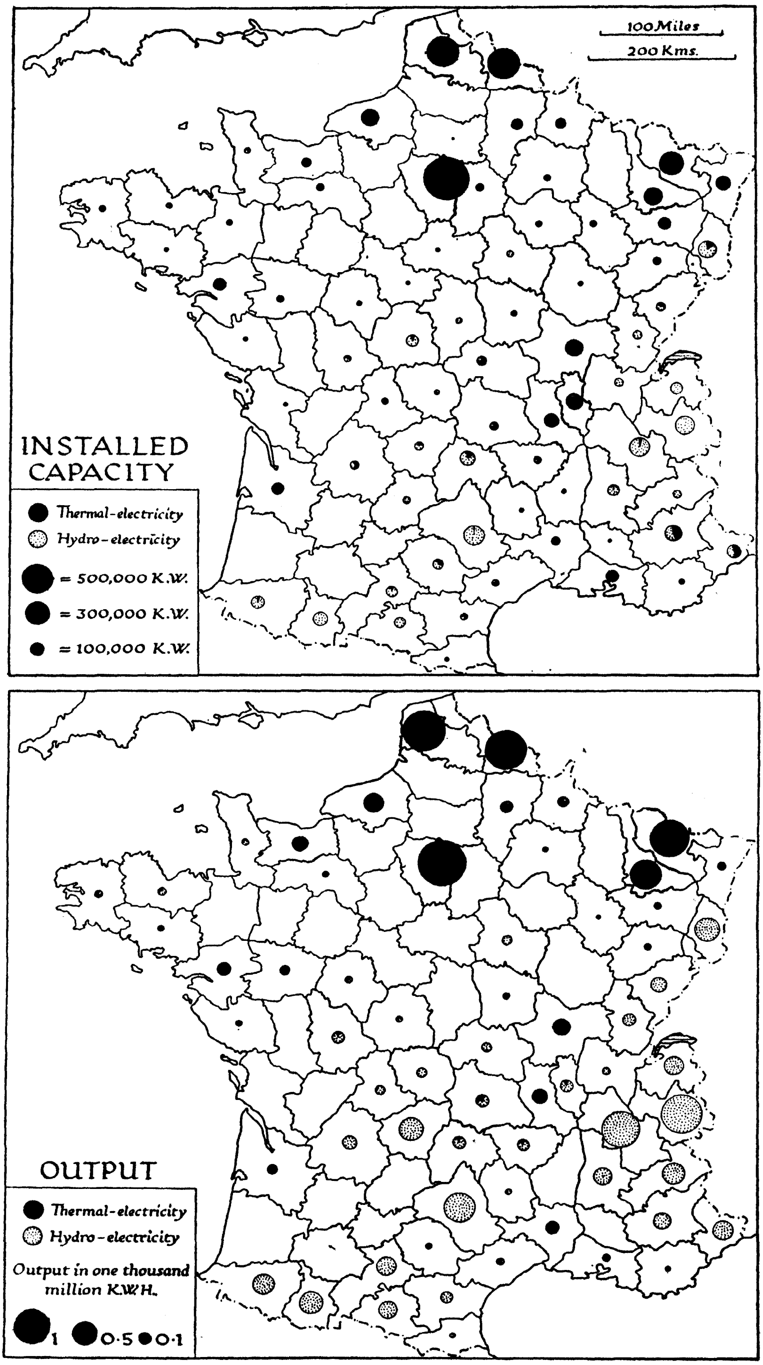


Fig. 77. Electricity: capacity and output. Above: installed capacity of generating stations by departments, 1936. Below: output of electric current by departments, 1936

Based on *Annuaire Statistique, 1938*, pp. 113–4 (Paris, 1939).

These maps serve further to emphasise the points referred to under Fig. 76.

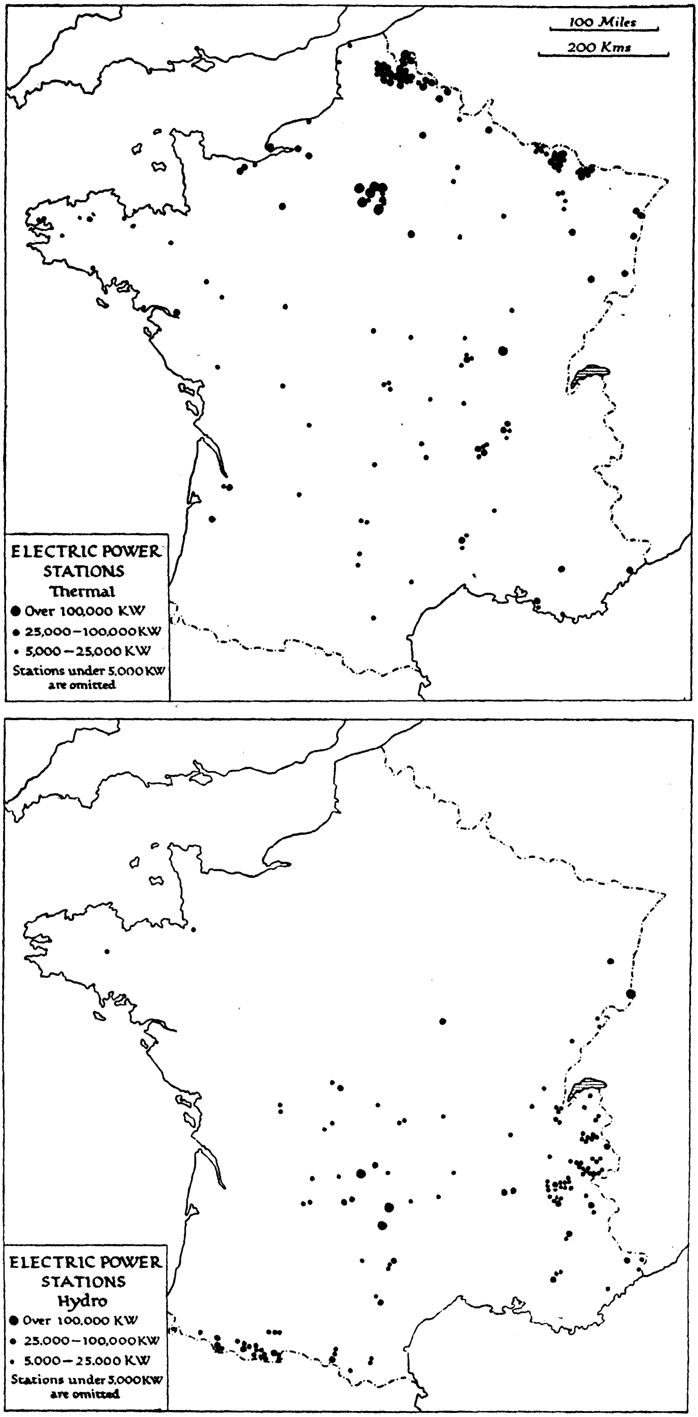

100 Miles
200 Kms
ELECTRIC POWER STATIONS
Thermal
● Over 100,000 KW
• 25,000–100,000 KW
• 5,000–25,000 KW
Stations under 5,000 KW are omitted
ELECTRIC POWER STATIONS
Hydro
● Over 100,000 KW
• 25,000–100,000 KW
• 5,000–25,000 KW
Stations under 5,000 KW are omitted

Fig. 78

Certain thermal installations have their sites decided mainly on grounds of distribution facility, e.g. those of Beautor in Aisne, Mohon in the Ardennes and Vincey in the Vosges, which supply areas otherwise far removed from sources of supply. Others are supplementary to hydraulic installations of unreliable water supply, e.g. Tuillière on the Dordogne, Cusset (near Lyons) on the Rhône, and St Tulle on the Durance.

Hydro-electricity. The war of 1914–18 made heavy demands on the coalfields, and the occupation and subsequent devastation of many of the mining areas hastened the scientific development of hydro-electric power. Most of the production takes place south of a line drawn from Strasbourg to Nantes. There are, however, several small installations in Brittany, of which the largest is at Guerlédan on the Blavet.

The districts of chief development are as follows:

(i) In the Alps, where the generating stations are very numerous (Fig. 78), but only a few use a great head of water. The tributaries of the upper Isère—Doron, Arc, Romanche and Drac—supply a large proportion of the total number of stations; much of the power in these valleys is used in the chemical and metallurgical industries and by the electrified line of the P.L.M. railway (see Plate 56, and Fig. 79). There are a few stations on the Durance, some on the Rhône just below Lake Geneva, and a small number in the valleys of the Alpes Maritimes. A huge new station at Génissiat, on the Rhône below Bellegarde, destined to become the largest in the country, was in construction in 1939.

(ii) In the Central Massif, a district of later development, there are several large installations, which have necessitated the damming of valleys in the construction of large reservoirs. The largest are those of Brommat, Sarrans and Marèges, the first two on the Truyère, a tributary of the Lot, and the third on the upper Dordogne (Plate 55). Together with Eguzon on the Creuse these stations play

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Fig. 78. Location of electric power stations

Based on official sources.

Thermal: the largest thermal stations are all located in Paris; other large plants are to be found mainly on the northern coalfield, the Moselle coalfield, the St Etienne coalfield, on the Lorraine ironfield and at the larger ports. Smaller stations lie on the numerous small coalfields of the Central Massif, and at various scattered towns in other parts of the country; many of the Lorraine plants are also of relatively small capacity, being run by blast-furnace gas mainly for the needs of individual smelting works. Hydro: the largest stations are in the Central Massif; the remainder of the medium sized and smaller stations are clustered in the Alps and Pyrenees, and scattered over the Massif. The flatter northern part of the country has none.

a large part in supplying Paris and the electrified railways of south-western France. Other streams utilized include the upper Tarn, the upper Vienne, the Sioule, a tributary of the Allier, and the Cère, a tributary of the Dordogne.

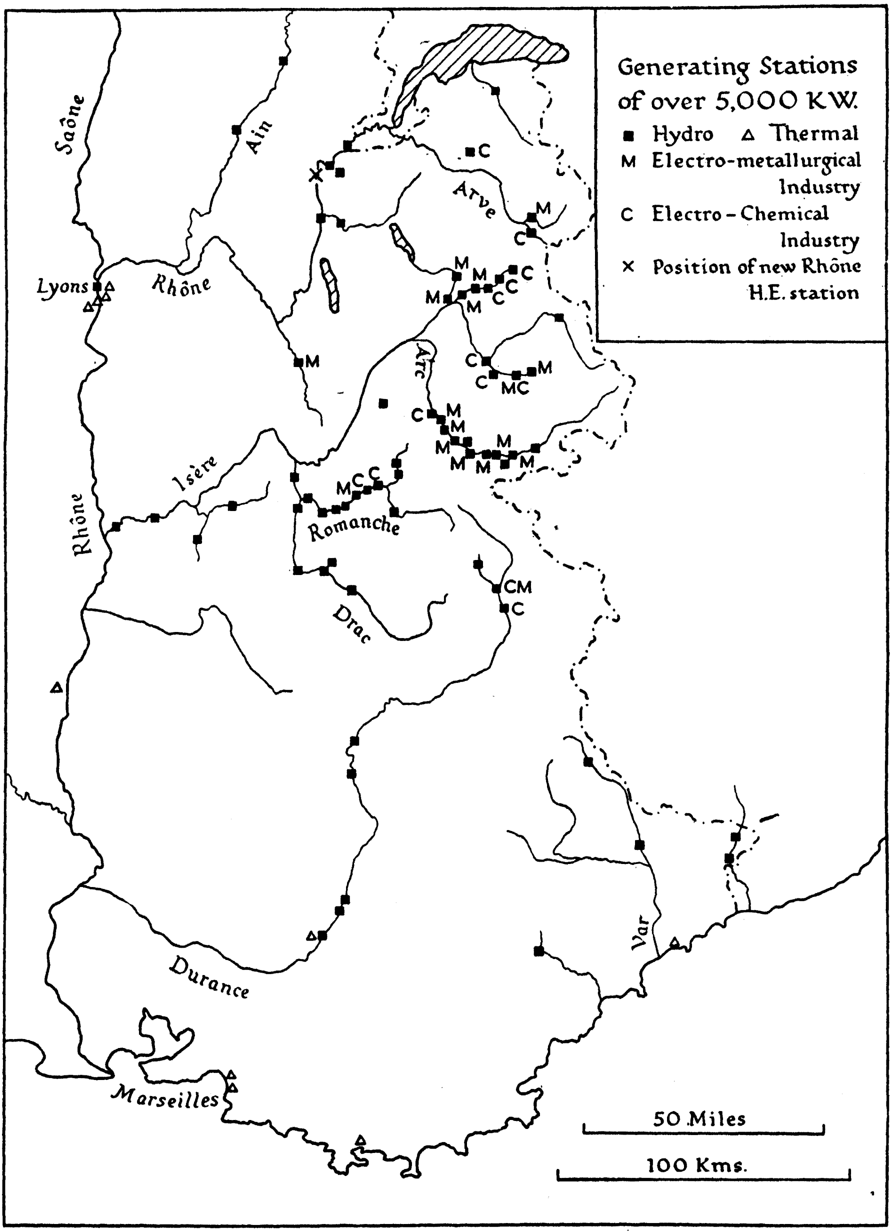
Generating Stations of over 5,000 K.W.
■ Hydro
△ Thermal
M Electro-metallurgical Industry
C Electro-Chemical Industry
× Position of new Rhône H.E. station
Saône
Ain
Arve
Lyons
Rhône
Arc
Isère
Rhône
Romanche
Drac
Durance
Var
Marseilles
50 Miles
100 Kms.

Fig. 79. Electric power and industry in the Alpine region

Based on official sources.

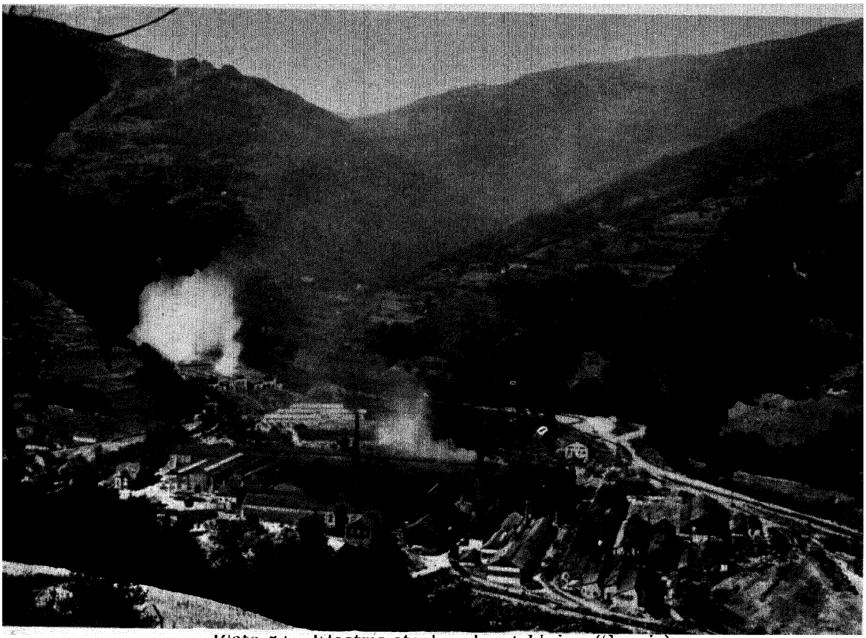

Plate 54. Electric steelworks at Ugine (Savoie)

Ugine is in the valley of the Arly, a little north of Albertville; it is the most important electro-metallurgical centre in the Alps. It will be observed that power and heat derived from coal is also employed. Industry here is in a rural setting of vineyards, alpine pastures and forests.

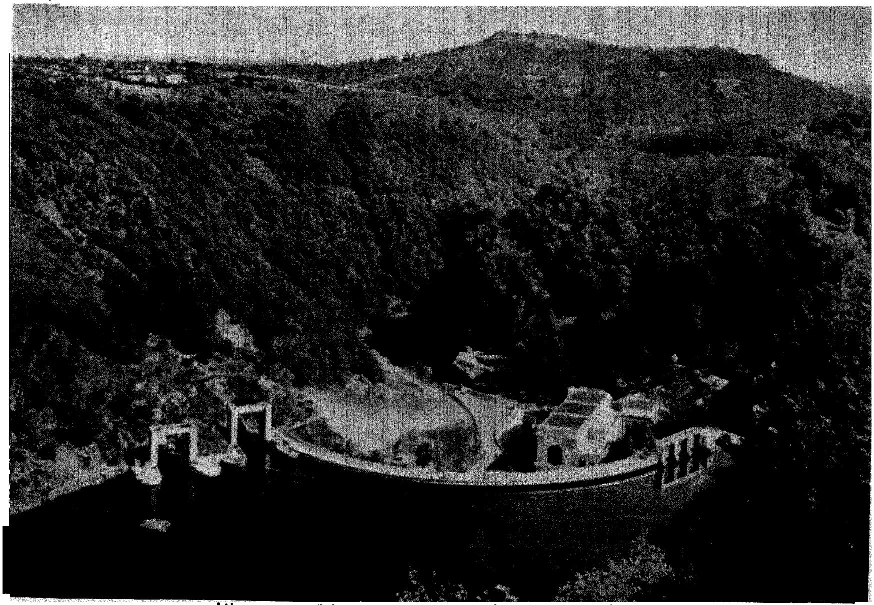

Plate 55. Marèges: dam and power station

One of the largest hydro-electric plants in France, situated on the river Dordogne in the Central Massif. The installed capacity is 132,000 kW., and the average annual output of current 300 million kWh. The river is dammed by a massive barrage, and a head of water amounting to 73 m. is thus created. The station supplies the Paris area and also the electrified lines of the P.-O. railway.

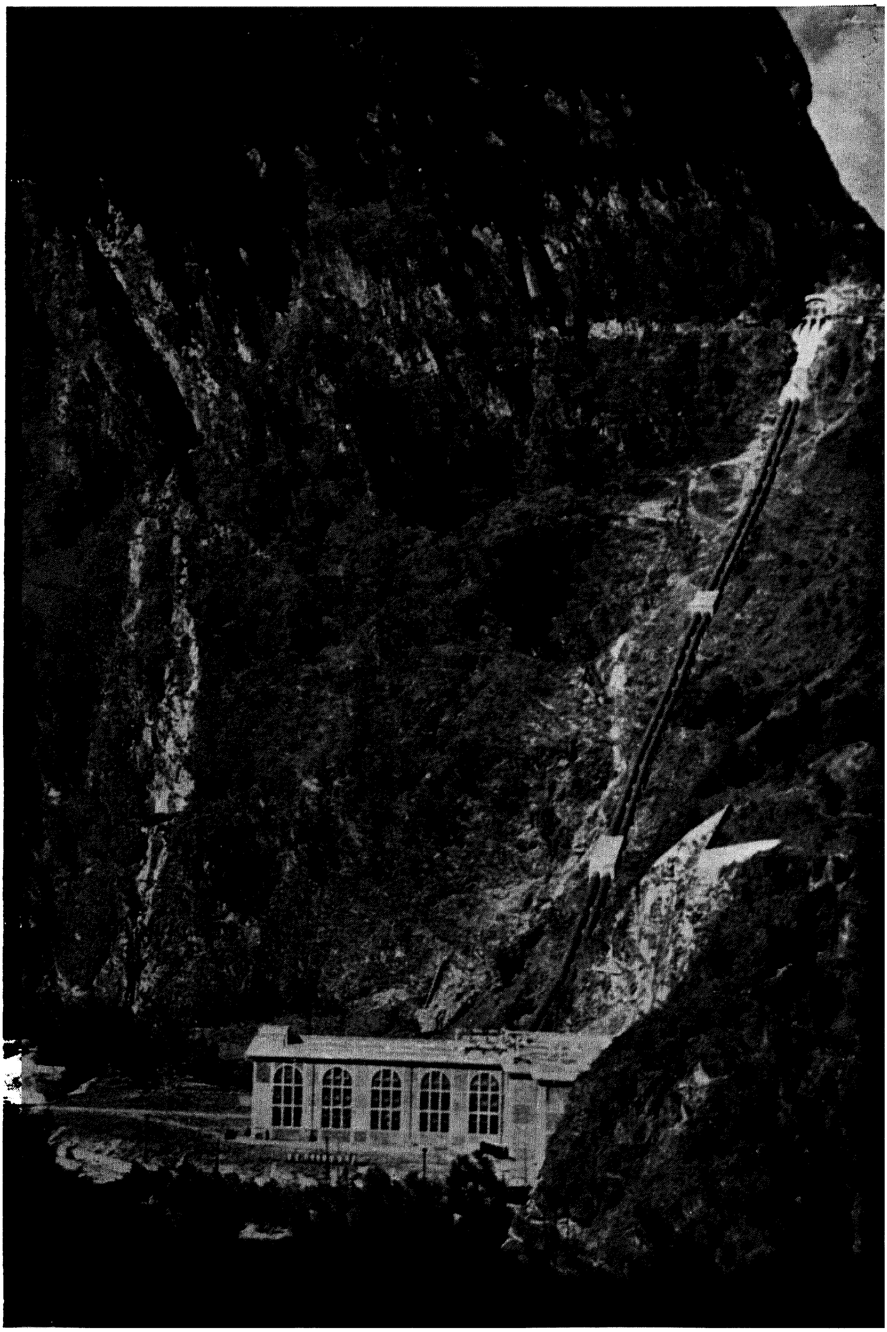

Plate 56. Chambon power station

On the Haute-Romanche river in the department of Isère, this is one of the latest additions to Alpine hydro-electric power supplies, opened in 1937–8. It is of relatively small capacity—only 2,070 kW.—but it is fed by a storage reservoir, and so the current generated helps to regulate the variable output of other installations in the same valley.

(iii) In the Pyrenees, the installations are not nearly so numerous as in the Alps, nor of so great capacity as the large ones of the Central Massif, but they mostly employ a great head of water. There are three main groups of stations—in the tributaries of the Adour, e.g. Gave d'Ossau, Gave de Pau, in the upper Garonne and its tributaries the Neste and Pique, and in the upper Ariège and its tributary the Vicdessos. Much of the power is used in the local chemical and metallurgical industries or by the electric railways.

One of the chief difficulties in the utilization of water power in generating electricity is the variability in the volume of water supply. In the Alps, innumerable small waterfalls supply generating stations, but failing a reservoir, the installations all suffer from shortage of water during the frost of winter and during the dry weather of August and September. The stations of the Central Massif also vary to a great extent in output according to season. Here the supply of water is highest in January, March and May, and lowest from July to September. The variability is less marked in the Pyrenean torrents, where, as in the Alps, the peak occurs with the snow-melt in June. Oceanic influence on the rainfall regime gives minor peaks in October and December. In late summer and autumn, however, the supply is very low—only 40% of the peak.

The Grid. After the war of 1914–18, it was necessary to find markets for the surplus power of the new generating capacity installed, and also means of transmitting the power in a reliable supply to the consumer; so there came about the elaboration of the great distributing organization known as the Grid. This, however, does not exercise such a complete control over power production as the Central Electricity Board in Britain, and there are large numbers of generating stations, especially hydraulic plants, which are of local significance only and are not linked to the Grid, as Figs. 78 and 80 indicate.

The generation and transmission of electric power is in the nature of a service. Electricity is not a commodity that can be stored in large quantity. Its generation, transmission and consumption are almost simultaneous and production depends, therefore, very largely on the hour-to-hour demand of the consumer. But modern electrical technique, which has facilitated the transmission of electric current to great distances, has made possible the organization of a great network of transmission lines, linking thermal and hydraulic generating stations. These stations are grouped in regions, and their management submits to a rigid discipline, so that, in spite of widely differing capacity and mechanical characteristics, complete synchronization of output can be maintained. This is accomplished by the use of switch and transformer stations erected in the consumer districts. Practically all supplies are distributed as alternating current. By means of the Grid, however, supplies to the railways passing through key sub-stations are transformed to railway voltage and rectified to direct current (see Fig. 69 in Vol. IV, Ch. IV). Fig. 80 shows how the various groups of generating stations, most of them

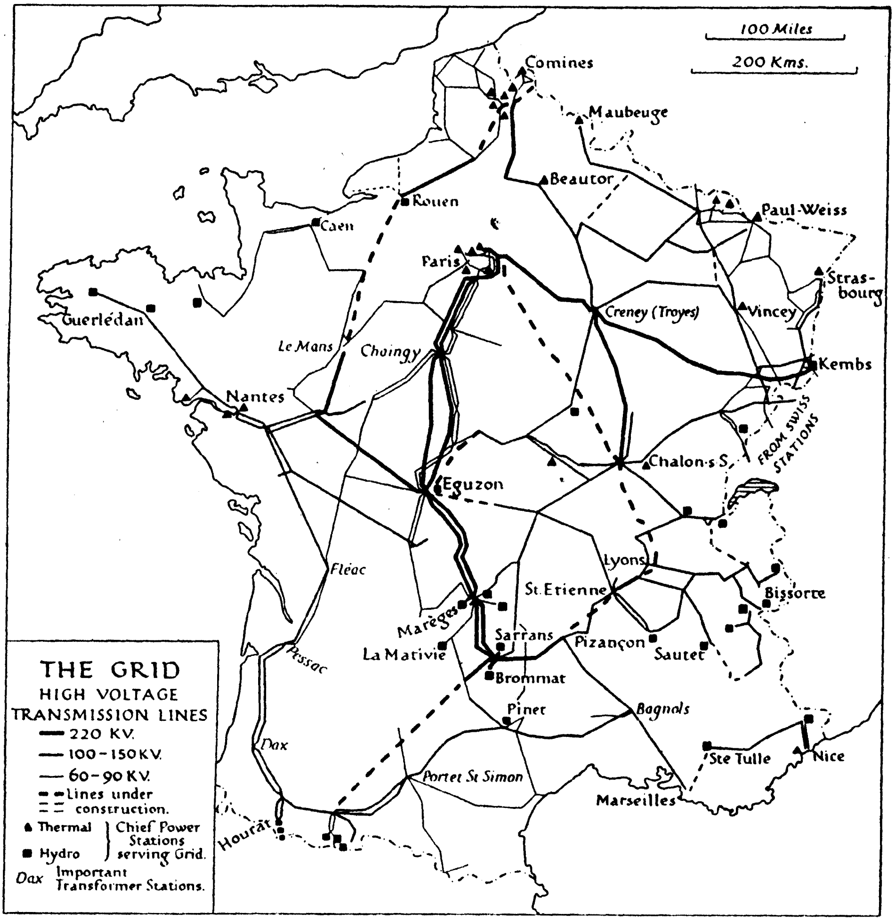

Fig. 80. The electricity grid

Based on official sources.

High-voltage transmission network and principal power stations supplying current. Lines carrying current at less than 60 kV. are omitted. There are numerous stations, mostly of small capacity, which are unconnected with the Grid system. These mostly serve local industries, e.g. the metallurgical industries of the smaller coalfields and the electro-metallurgical and electro-chemical industries of the Alps and Pyrenees (cf. Figs. 78 and 79, and Plate 56).

serving local industrial regions, are able to supply distant markets and to supplement each other in maintaining a reliable supply of current. The importance of the Central Massif in supplying Paris and the railways through the great sub-station of Eguzon is clearly seen. Paris also taps, through the sub-station of Grenay (Haute Marne), the Kembs station on the Rhine. By the Henri-Paul sub-station at Chalon-sur-Saône it will eventually be connected with the Rhône station at Cusset near Lyons and with the Alpine supplies. Minor transmission lines connect the Pyrenean supplies with Bordeaux and the lower Loire and with Toulouse and the Central Massif; they also supply the railways. Rouen connects with the north and will eventually link up by a major line with the important sub-station at Saumur on the Loire. This line is not connected with Paris, which is practically independent of the north supplies.

With the development of the Grid, there has been a tendency for the hydro-electric stations to provide an increasing proportion of the national supply. In 1937, which may be regarded as a representative year, the hydro-electric plants were running to full capacity and taking the base load of the Grid, while the thermal plants, in spite of having twice the capacity of the hydraulic installations, were comparatively little used, many of them being in a state of suspended animation. The reason was the shortage of coal and the resulting high cost of thermal electricity. The thermal plants of Lille and Lorraine still carry the base load of their heavy consumption, but many steam plants now, particularly in the Paris area, are redundant.

CHEMICAL AND ALLIED INDUSTRIES

Two factors have greatly influenced the development of French chemical industries in the last quarter of a century. One is the fundamental reconstruction of industry in the coalfields since 1918, and the other is the setting up of hydro-electricity services in southern France as a result of the scarcity and cost of home-produced coal. To these two factors may be added the stimulus afforded by the political movement towards self-sufficiency which has characterized European policy for some time past.

The chemical industries may be divided into those based on the coalfields and coal-importing ports and those based on hydro-electricity.

Coal Distillation Products

The chemical industry has greatly benefited by the discovery of the uses which can be made of the waste products of the coke ovens, retorts and blast furnaces—gas, coal-tar, ammonia, basic slag, etc. To-day, the profits from the former 'waste' products often greatly surpass those from the sale of the coke. For example, the output of the Béthune mines yields something like 15,000 tons of coal tar, 53,000 tons of sulphate of ammonia, and 3,000 tons of benzine products a year; while that of the Liévin mines produces 7,500 tons of coal tar, 951,000 litres of benzine products for motor fuel, and 87,000 litres of naptha solvent. The synthetic petrol installations of Béthune and Liévin were able to produce, by 1937, 6,000 tons of petrol a month. The Béthune and Courrières mining companies also manufacture methyl and ethyl alcohols. The Lens company makes synthetic formol used in the manufacture of resins. In Lorraine the La Houve mine produces coal tar, sulphate of ammonia and synthetic ammonia among other products.

Output of Coke and Distillation Products, 1936
(*in thousand tons*)

	Coke	Tar	Sulphate of ammonia	Benzol	Gas (mill. cu.m.)
From coke ovens:					
Metallurgical coke	5,038	268	88	76	2,757
Other qualities	2,063				
From gas works	1,859	206	16	12	1,559
Total	8,960	474	104	88	4,316

Coke and Gas (see Fig. 67). Of the 7·1 million tons of coke produced by about 3,600 coke ovens, 3·9 million tons came from pithead cokeries (mainly in Nord and Pas-de-Calais) and 2·6 million tons from cokeries attached to smelting works (mainly in Lorraine). The coke ovens consumed 9·2 million tons of coal, 60 % of it French, 21 % German, 12 % Belgian, and 4 % British. Of the gas produced almost exactly one half was employed for heating furnaces; only 6 % was used for the extraction of by-products, and the remainder passed to industrial and domestic consumers.

The production of gas-works coke as a by-product of the distillation of coal in retorts is naturally far more widespread, for there are gas works in every department of the country. The great gas works of the Paris area however (department of Seine) are responsible for about 40 % of the entire output. The gas industry in 1936 consumed about 3·9 million tons of coal, 64 % of it being of French origin, 22 % British, and 13 % German. The British coal was used especially in Paris, at the west coast ports of the lower Seine, Loire and Gironde, and on the Mediterranean coast.

Coal Tar and Coal-Tar Products. The production of coal tar has remained at a level of about half a million tons a year for some years. One ton of coal yields about 1 cwt. (50 kg.) of tar. Sixty per cent of the output comes from the northern coalfield, Lorraine and Paris. In addition to the French output, some 230,000 tons of tar were imported, mainly from Britain, making a total consumption of about 700,000 tons. Of this amount about 600,000 tons were submitted to further distillation; 390,000 tons were partially distilled only, to produce road-surfacing material. The pitch derived from the distillation is used in the manufacture of patent fuels (*briquettes* and *boulets*), for which there are about 120 factories, located for the most part on the coalfields or at the ports where coal and tar are imported.

Patent Fuel Production, 1936 (*in thousand tons*)

Region	Department (locality)	Output
Northern coalfield	Nord	2,777
	Pas-de-Calais	913
Central coalfields	Gard (Alès)	1,140
	Loire (St Etienne)	424
	Saône-et-Loire (Blanzy)	323
	Tarn (Albi)	104
Ports	Seine-Inférieure (Havre, Rouen)	449
	Calvados (Caen)	269
	Loire-Inférieure (Nantes, etc.)	448
	Charente-Inférieure (La Rochelle, etc.)	221
All other localities		1,450
	Total	8,518

The most important of the products of further distillation is benzol, from which, by successive distilling, are derived naphtha, creosote products, lubricating oils and benzine for motor spirit; another is naphthaline, from which in turn are derived aniline for dyeing processes and also explosives, tear gas and perfume products. The output of benzol from coke ovens and gas works in 1936 was 88,000 tons, but this did not suffice for home consumption which in the same year amounted to 105,000 tons and in 1937 had risen to 121,000 tons.

Synthetic petrol to the extent of about 1,000 tons a month can be produced by the installations at Béthune, Liévin and Paris.

The quality and range of *dyestuffs* have increased enormously of late years. They are manufactured on the coalfields conveniently adjacent to the supply of coal tar and sulphuric acid, and also at the ports, both maritime and fluvial, e.g. Paris, Creil, Lyons, Troyes and Oissel near Rouen. Proximity to the textile industry is obviously a locating factor.

Chemical fertilizers. Of the coalfield fertilizer products, sulphate of ammonia is one of the most important; the average annual production in the years 1934–7 was 302,000 tons. Basic slag, residual from the smelting of phosphoric ores, comes also from the northern coalfield and from Lorraine. Over a million tons were produced in 1936. One of the artificial manures, superphosphate, is manufactured chiefly at the ports, e.g. Rouen, Nantes, Tonnay-Charente, La Pallice and Bordeaux, with the aid of sulphuric acid and imported phosphates from the French North African possessions. North Africa and France together produce over half the world's supply of phosphate rock, and the French output of superphosphate is over a million tons a year. For sulphuric acid manufacture the chief raw material is iron pyrites. There is a deposit at Sain-Bel, 20 km. west of Lyons, in the schists of the Central Massif, but half a million tons a year are imported, mainly from Spain and Portugal. Copper pyrites may also be treated, and a factory at Port-de-Bouc produces, as a by-product, copper sulphate for vine spraying.

Potash. France is fortunate, so long as she possesses Alsace, in having one of the two richest deposits of potash in Europe. The salt lies beneath the forest of Nonnenbruch, just north of Mulhouse (Plate 58). About a score of mines are connected with the Colmar-Mulhouse railway. The deposits contain 12–22% pure potash. They were discovered about 1900, but were only fully exploited after the recovery of Alsace by France. The reserves are estimated to last 500 years at the present rate of extraction. In 1926, competition with the German Stassfurt salts became so acute that it was necessary to negotiate an agreement, by which 30% of the French and 70% of the German product might be marketed up to a total of 800,000 tons of pure potash output, beyond which equal amounts might be sold. This agreement was to some extent undermined by intensive development of resources in Spain, the U.S.S.R. and the United States. From a peak output of 3 million tons in 1929 the Alsace production fell to 1·9 millions in 1932 but had recovered to 3·2 millions in 1938. The oldest and largest company is that of the ex-German *Mines Domaniales de Potasse d'Alsace* near Mulhouse. It was purchased by the state in 1924.

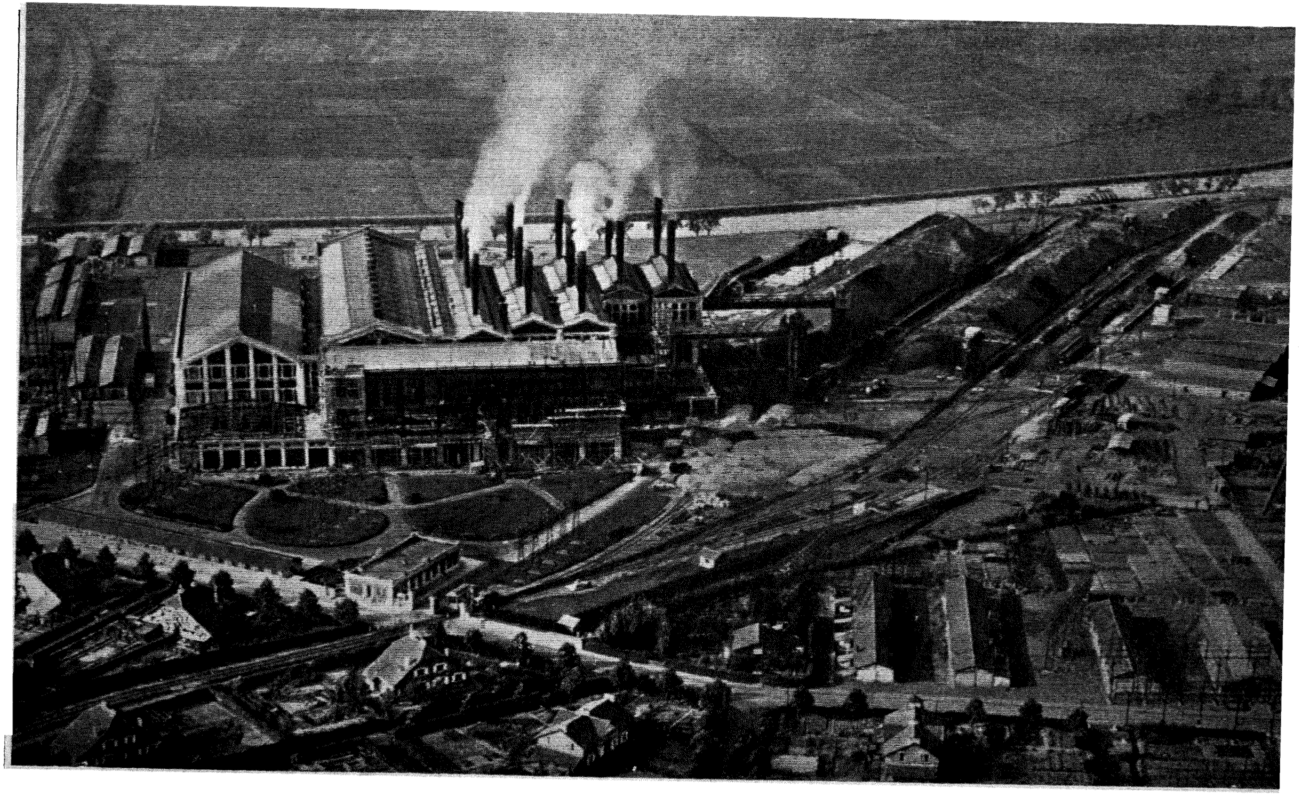

Plate 57. The power station at Comines

One of the largest thermal-electric stations in France, situated on the Belgian frontier north-west of Lille. The canalised river Lys (which forms the frontier) supplies waterborne coal, and there is rail connexion also.

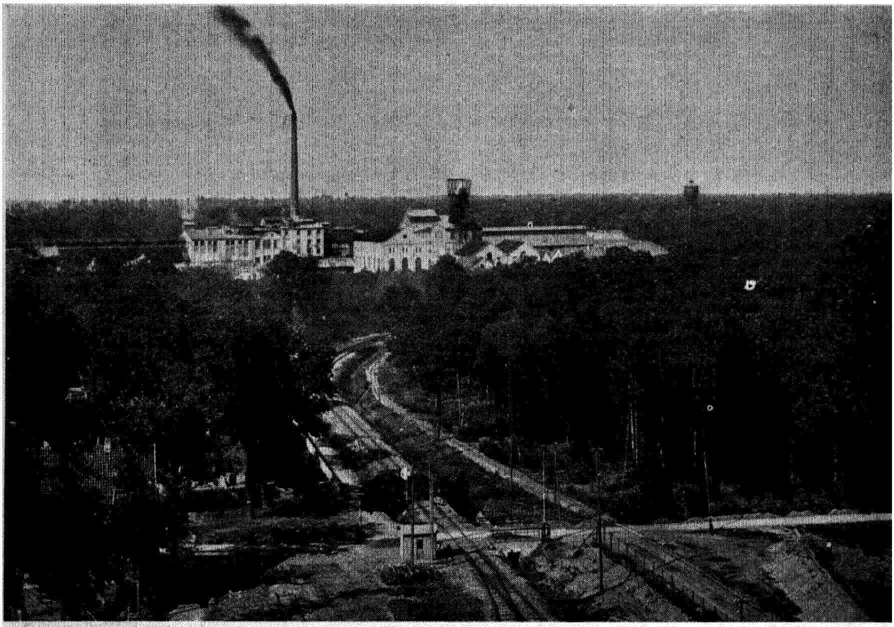

Plate 58. Potash mine in Alsace

The Amélie II Mine, north of Mulhouse. The potash is obtained from rocks of Oligocene (Lower Tertiary) age, at depths of from 200 to 700 m. The discovery of the mineral has brought industry and people into the midst of the ancient forest of Nonnenbruch.

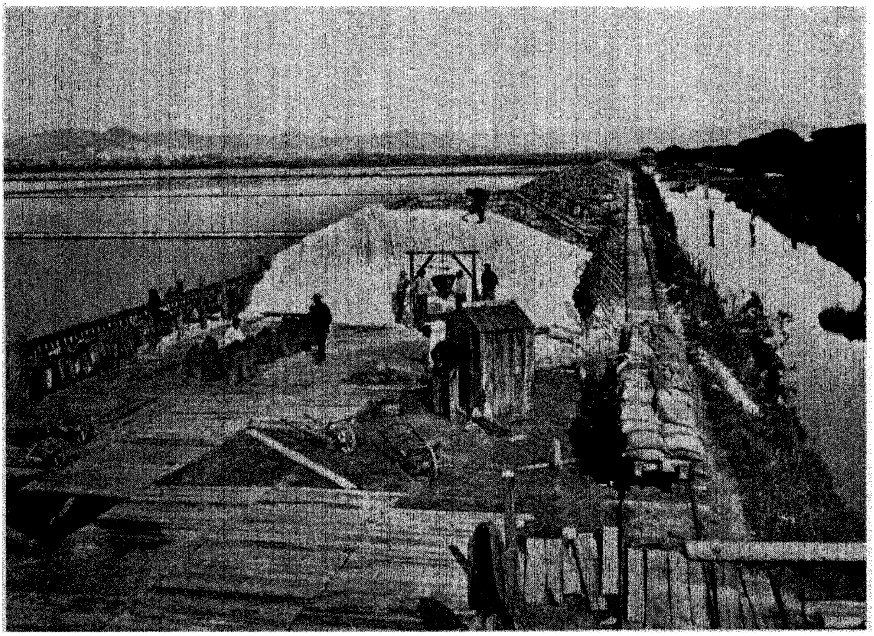

Plate 59. Salin des Pesquiers (Var)

Salt-pans on the edge of the Etang des Pesquiers, a few km. east of Toulon.

Other French sources of potash are at Boudigot in the Landes; there is also potash, unworked at present, in the Montagne Noire in Languedoc. Of the potash mined for export, nine-tenths goes by water from Strasbourg to Antwerp, as it is too expensive to rail the salt to Dunkirk. In recent years between 20 and 25 % of the output has been exported, and the rest consumed in France. The chief customers for the exported salt are Belgium-Luxembourg, Holland, the United States and Great Britain.

Common Salt occurs as rock salt in the Lias clays of Lorraine where it is mined in the valley of the Sanon, tributary of the Meurthe. Most of the salt is, however, extracted by solution and brine pumping. There are brine pits and refineries at Varangéville, at Rosières-aux-Salins and also at Dombasle, where the great Solvay soda works are situated. Salt is exported from this district by rail and canal to Paris, Rouen, Lille and Maubeuge to supply glass and pottery works, textile, soap and paper factories, as well as for domestic use.

Salt also occurs farther north in the department of Moselle, where the Seille river basin is dotted with depressions filled with shallow lakes, the result of subsidence caused by the pumping of brine from the underlying salt deposits. Château-Salins and Dieuze are centres of salt refining, and Dieuze has chemical works dependent on the local brine. Apart from these two main sources of common salt, there are deposits at Lons-le-Saunier and Poligny on the edge of the Jura in the Franche-Comté area.

In the Mediterranean region, salt is obtained by evaporating water from the lagoons along the coast in salt-pans. Chemical industries at Marseilles are supplied from this source (Plate 59).

Production of Salt, 1936 (*in thousand tons*)

Rock salt and brine pumping		Marine salt-pans	
Meurthe-et-Moselle	1,210	Bouches-du-Rhône	86
Moselle	193	Gard	41
Jura	167	Aude	31
Doubs	27	Var	25
Basses-Pyrénées	78	Others	19
Others	36		
Total	1,711	Total	202

Electro-chemical products (Figs. 79, 81)

The development of electro-chemical industries has accompanied the development of hydro-electric power supplies. The making of calcium carbide and its fertilizer derivative calcium cyanamide requires the very high temperatures of the electric furnace. Calcium cyanamide is used for making synthetic nitrogen from the air for explosives and for manures. Numerous chemical works are attached to the hydro-electric stations in the Alps and Pyrenees. In the Alps they are located chiefly in the Doron, Arc and Romanche valleys; the largest installation is at l'Argentière near the head of the Durance. In the Pyrenees the largest plant is at Auzat in the Vicdessos valley.

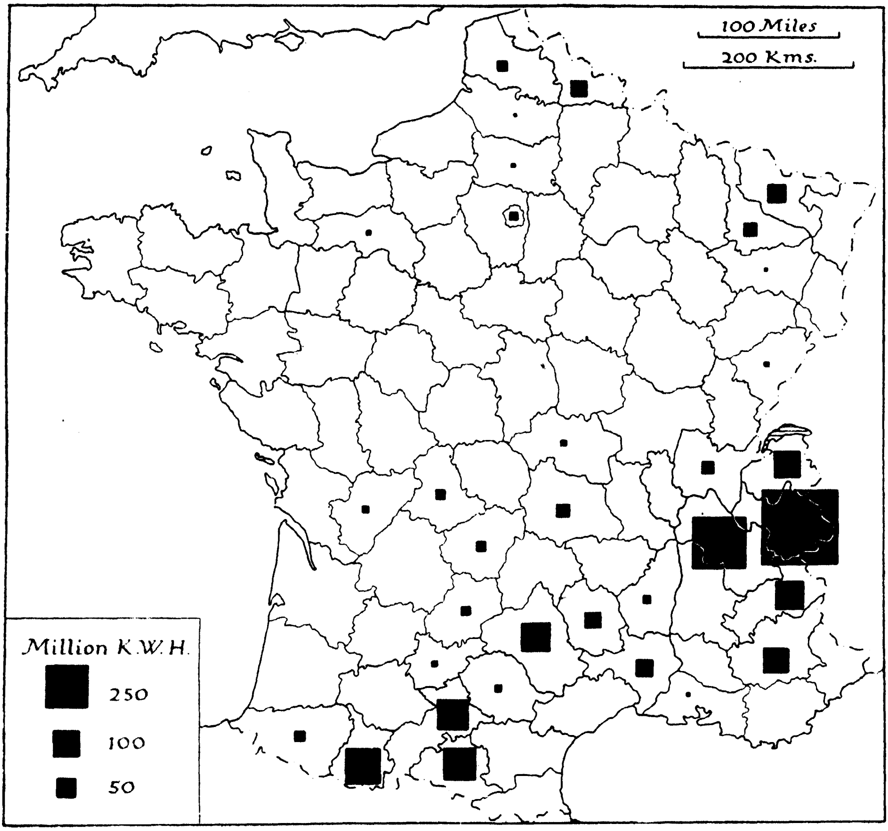

Fig. 81. Consumption of electric power in chemical industries, by departments, 1936

Based on *Annuaire Statistique, 1938*, pp. 113–4 (Paris, 1939).

Miscellaneous Industries

Oil refining. France's production of crude oil is almost negligible. The oil wells of Pechelbronn in Alsace, stretching in a line from Morsbronn to Cleebourg, provide less than 1% of the French consumption of mineral oil, which in 1936 amounted to 6 million tons. The refining of imported oil, however, has made great strides of late years. The first step was the acquisition of control over supplies of crude oil, through French participation in the working of the Iraq oilfield. A national company, *Compagnie Française des Pétroles*, was formed in 1924 to carry out this work. Later came the establishment of a refining industry in France. A second national company was formed in 1929, the *Compagnie Française de Raffinage*, 55% of the capital being subscribed by the *C.F.P.*, 35% by a group of French marketing concerns, and 10% by the government. This company built two refineries, one at Gonfreville-Orcher near Havre, which commenced production in 1933, and the 'Raffinerie de Provence' at Martigues, which began in 1935. Several smaller refining companies were also formed. Furthermore, the imposition in 1928 of a customs duty on imports of gasoline and other refined products had the effect of encouraging foreign interests to undertake refining in France, and

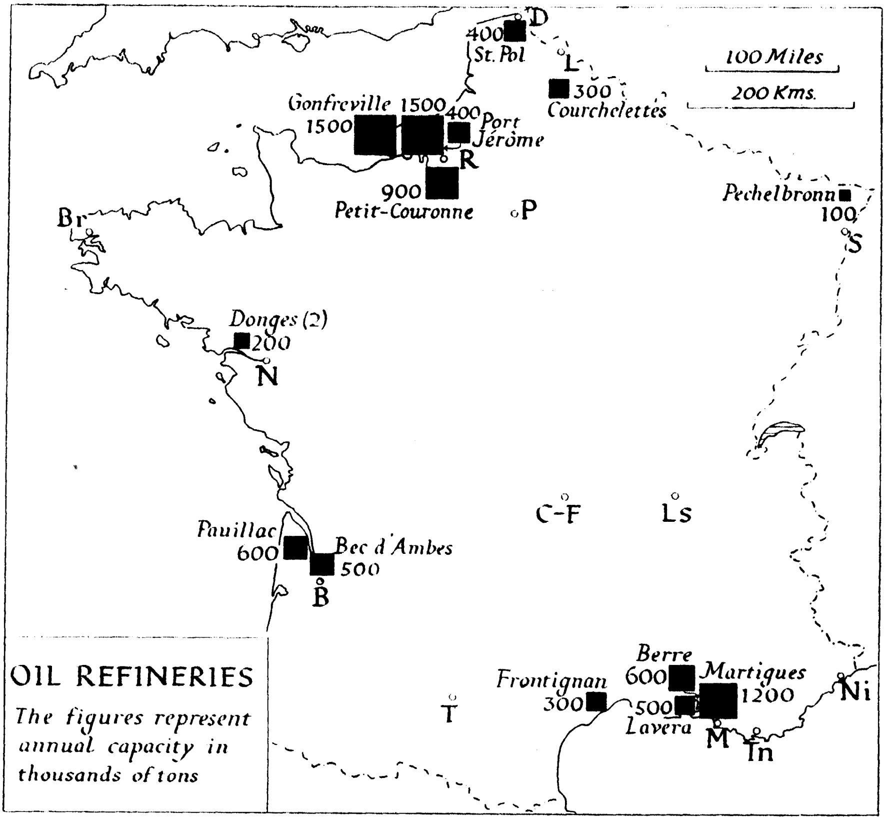

Fig. 82. Oil refineries, 1939

Based on official sources.

The refineries shown are complete plants, equipped for all refining processes. Smaller plants, with a limited range of refined products, are omitted. A few major towns are indicated by initials.

refining companies were formed by the leading international concerns with French capital participating to some extent. Eventually, fifteen complete oil refineries were established, all but two of which lie on or near the coast. These had, in 1939, a total annual refining capacity of 9 million tons, distributed as follows: *Compagnie Française de Raffinage*, with two refineries, 2·7 million tons; other French companies, with five refineries, 1·3 million tons; *Royal-Dutch-Shell*, with two refineries, 1·5 million tons; *Anglo-Iranian*, with two refineries, 0·8 million tons; other companies, mainly American, with four refineries, 2·7 million tons.

The geographical distribution of the refineries is shown on Fig. 82. Of the thirteen large coastal and near-coastal refineries, four, including the two largest, are located on the lower Seine, three on the shores of the Etang de Berre, four on the middle west coast near Bordeaux and St Nazaire, one near Sète and one at Dunkirk. Of the inland plants, one is at Courchelettes, near Douai (see Fig. 73), and one on the oilfield at Pechelbronn.

A few other refineries, of a more or less specialized nature, deserve mention. That at La Mailleraye, on the Seine below Rouen, is the oldest in France; it specializes in white oils, from which lubricants are derived. At Autun, on the Autun-Epinac coalfield, there is a small refinery which treats locally produced shale. In recent years several experimental plants have been established to produce oil from coal by the hydrogenation process; their total annual capacity was 40,000 tons of aviation gasoline. The chief is at Mazingarbe, near Béthune; others exist at Liévin and at Haines, near Calais. The production of substitute fuels has also expanded in recent years, and the alcohol industry, mentioned below (p. 233), has yielded annually some 200,000 tons of automotive fuel.

Vegetable oil refining. Another industry that has associated itself with the ports and has achieved considerable importance of late years is the crushing of oil seeds of various descriptions, the extraction and refining of the oil, and its treatment, together with animal fats, in the manufacture of soap, candles, margarine, etc. Marseilles is one of the greatest importers of tallow and oil seeds and has great and old-established factories; but Paris, Lyons and Nantes now also have large installations. The modern processes of hydrogenation, etc. have made possible the utilization of a great variety of vegetable and animal oils. Marseilles employed originally local and then African olive and palm oil in the production of soap and candles. To-day many kinds of eastern oil seeds are used as well—cotton seed, linseed, palm kernels, copra, soya beans and many others. The northern ports use larger proportions of whale oil, linseed and cotton-seed oils. Alfortville and Maisons-Alfort in the Paris area have large soap works. Nantes makes oil for sardine preserves. The manufacture of oil cake for cattle food is a subsidiary industry in all the large ports.

Plastics. The plastics section of the chemical industry has for long been a special activity in France, developed by highly skilled craftsmen in the Jura district. The making of pipes and combs, etc. from local boxwood was greatly developed when, with the exhaustion of this raw material, plastic materials, such as vulcanite, celluloid and casein, were introduced. All kinds of articles are manufactured—domestic utensils, toys, dress ornaments, surgical appliances, glass substitutes, etc. In the highlands the industries are largely carried on in cottage and small factory units.

Paper making. This industry requires plenty of running water, preferably with a high degree of hardness, and the older mills are situated in valleys where swift streams could provide power and carry off the waste—the streams of the chalk region of Artois, for example, or those of Caux in Normandy. Some of the Alpine and Pyrenean streams provide power for paper mills, e.g. in Grésivaudan and the Salat valley. The chief raw material is wood pulp, easy to transport in the dried form in which it is imported from Sweden. Local wood pulping is associated with paper mills, as in the Vosges, near Epinal. Reeds from the Camargue—the Rhône delta—are used in the manufacture of cellulose.

Cement. The abundant distribution of limestone of various types has been a great asset in the major industry of cement making. The industry is fairly widespread, though certain concentrations are naturally observable in the main regions of limestone and chalk outcrop.

Six broad regions are distinguishable. (i) The most important is the northern chalk region extending from the channel coast in the region of Boulogne through Artois to the St Quentin-Laon district. Here the chalk marl is used in the manufacture of Portland cement; about one-fifth of the entire French output comes from this region. (ii) The lower Seine and Oise valleys between Paris and Mantes have several large works using chalk and Tertiary clays, also for Portland cement (Plate 60). (iii) The same product is derived from the Jurassic limestones in Lorraine, where too the slag from the iron works is used as a raw material. (iv) The Jurassic limestones on the south-eastern flanks of the Paris basin are also used in the departments of Yonne and Cher; much of the output of the works in the Loire valley in Cher is hydraulic cement. (v) The Aquitaine basin, with abundant limestone of various types and ages, has several producing regions, concentrated in the neighbourhood of Bordeaux and Angoulême, and more scattered in the departments of Tarn, Lot-et-Garonne and Dordogne, the last-named specializing in hydraulic cement. (vi) In the south-east the Jurassic and Cretaceous limestones yield cement in four main areas—in the Grenoble-Chambéry-Ambérieu district of Isère and Ain, in the south-eastern corner of the country in Alpes-Maritimes, in the Marseilles region in Bouches-du-Rhône, and in the Rhône valley in the limestone area of lower Vivarais, where Le Teil (in Ardèche) makes hydraulic cement.

Cement Industry, 1936 (*in thousand tons; only departments using more than* 100,000 *tons of limestone*)

Region	Department	Limestone and chalk quarried	Cement output
The North	Pas-de-Calais	1,263	824
	Nord	252	213
	Aisne	256	217
Lower Seine	Seine-et-Oise	966	800
Lorraine	Moselle	421	461
South-east flanks of Paris basin	Marne	219	181
	Yonne	105	74
	Cher	362	297
Aquitaine	Gironde	341	253
	Charente	162	121
	Dordogne	216	130
	Tarn	140	105
The south-east	Isère	503	353
	Ain	101	56
	Alpes-Maritimes	235	189
	Ardèche	368	317
	Bouches-du-Rhône	465	296
All other departments		1,209	1,131
Total		7,584	6,018

From *Statistique de l'Industrie Minérale, 1936* (Paris, 1938).

In addition to the 7·6 million tons of limestone and chalk employed in the cement industry, 0·7 million tons of clay and 0·5 million tons of slag were used. Small quantities of bauxite were employed in the manufacture of special quick-setting cement. Finally, nearly 11 million tons of sand and gravel were quarried in 1936 for making mortar and concrete.

Gypsum for the manufacture of plaster of Paris is dug mainly in the Marne valley east of the capital; the three departments of Seine, Seine-et-Oise and Seine-et-Marne in 1936 produced 860,000 tons out of a total French output of 1,344,000 tons.

Rubber. The resins form the basis of another group of chemical products. Of these rubber comes first in importance. The raw product is not costly to import or transport and the location of the rubber industry has no geographical significance, except that it appears to avoid the frontiers, being located chiefly in the upper Loire district at Clermont-Ferrand and Montluçon. These two towns are the seats respectively of the Michelin and Dunlop motor-tyre works (see Plate 70). St Ouen in north Paris and the Ivry-Vitry district of south Paris also have rubber works. To-day, reclaimed rubber is increasingly used.

Alcohol. The distillation of alcohol from potatoes and beet root is an old industry. Since 1918 the innumerable small refineries have been to a large extent replaced by larger establishments. They are situated in the north, where the cultivation of beet is carried on, and are as ubiquitous as the sugar refineries of Picardy, Artois and Santerre. Paris also has great distilleries.

TEXTILE MANUFACTURES

The French textile industry is very widely disseminated (Fig. 83). True, there is major concentration on and in the neighbourhood of the northern coalfield, and the formerly scattered Norman industry is now concentrated about Rouen, but the old-established industries of Reims and Troyes are still important, and those of the upland valleys of the Vosges, Jura and Alps have retained their position to a great extent. Mulhouse and Lyons, however, exert a strong centralizing force.

There are four major textile regions (Fig. 84): (1) in the north, focused on Lille, where the cotton industry takes the first place, but where linen, woollen, rayon and mixed fabrics are also important; (2) in and around Rouen, where cotton spinning is the main activity, but where wool and linen are still important; (3) Alsace, where the cotton- and calico-printing industry is focused in Mulhouse and cotton weaving spreads across the Vosges; (4) the widespread Lyons region, where silk and rayon are the main interests.

The French textile industry has retained to a much greater extent than that of iron and steel the characteristic feature of small family concerns, even in the spinning section, but to more marked extent in the weaving. There is little sign of vertical integration, another notable contrast with the metallurgical and coal industries. Only about one-half of the cotton industry has combined spinning and weaving units. There is great local specialization, even in the major divisions of the industry. The northern area, for example, is more engaged in spinning yarns than in weaving, whereas in the western Vosges the two activities are equally divided. Possibly the softer waters of the Vosges may be a factor here. Calico-printing is a speciality of the Alsace textile area. In the Lyons silk area, too, there is local specialization, the ribbon making of St Etienne being an example.

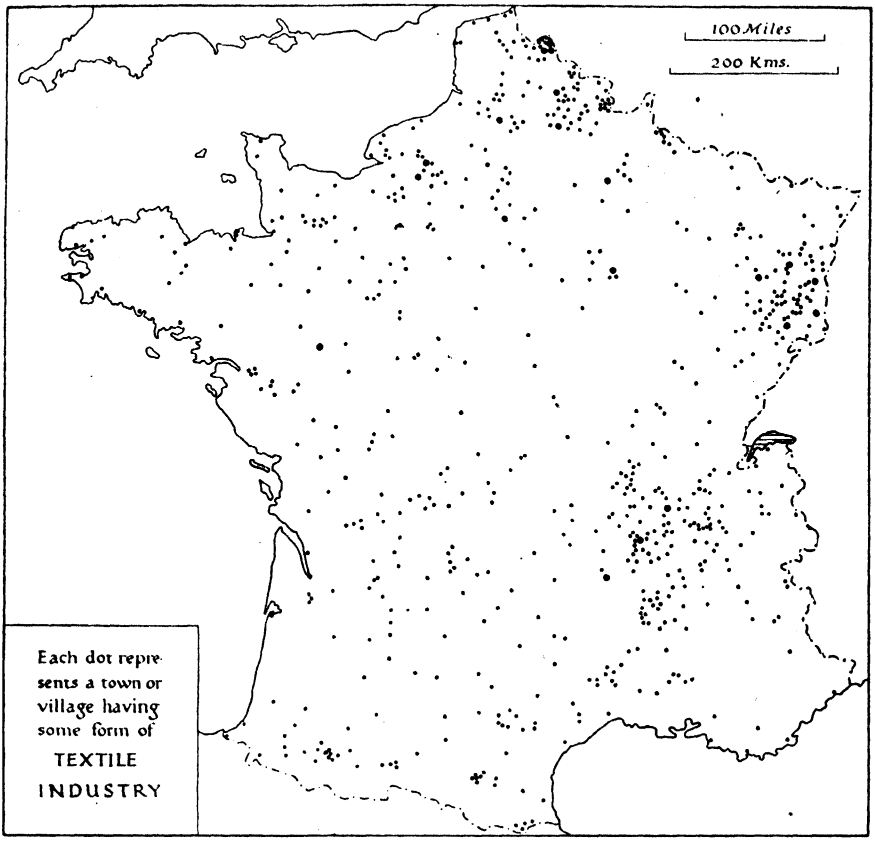
100 Miles
200 Kms.
Each dot represents a town or village having some form of TEXTILE INDUSTRY

Fig. 83. Distribution of textile industries

Based on the *Atlas de France*, Plate 49 (Paris, 1933).

This map indicates the widespread character of the textile industries in France, while also suggesting certain major concentrations (cf. Fig. 84). The more important individual centres are shown by larger dots.

The Woollen Industry

The manufacture of wool and flax early concentrated in the Flanders plain. Wool was imported from England and cloth-making flourished. With the development of steam power, wool combing became a special occupation in the neighbourhood of the Belgian frontier, centring at Roubaix and Tourcoing. London re-exported large quantities of wool to this district before 1914, and the combed wool found good markets in continental Europe. After 1918 the reconstructed industry made great strides and began to specialize in light cloths, particularly for women's wear. Soon this industry was as well equipped as any in the world. Alsace also has a considerable share in it, chiefly at Colmar and Mulhouse, and the old woollen town of Elbeuf, near Rouen, revived its industry as a result of the 1914 invasion of the north. Some 90% of the raw wool is imported.

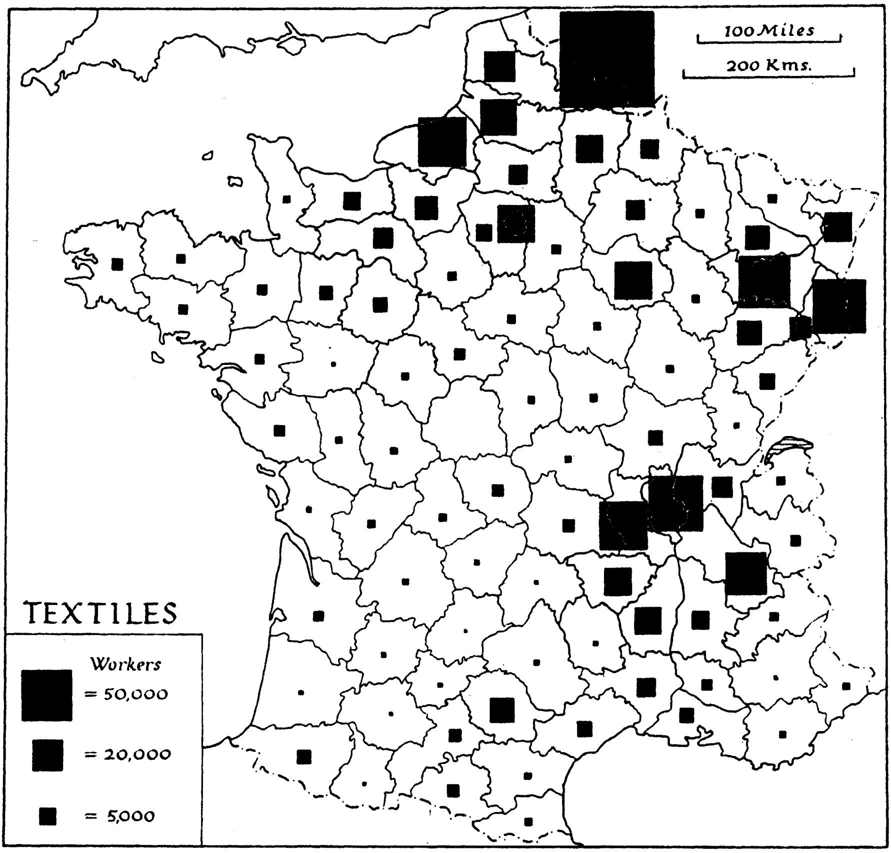

Fig. 84. Distribution of textile operatives by departments, 1936
Based on *Recensement général, 1936, Tome I* (Paris, 1938)

France now imports directly from Australia, short circuiting the London market. She also imports considerable quantities from South Africa and small amounts from Algeria.

At the last census 167,500 persons were employed in the woollen industry as a whole (cf. table on p. 173). Over half the mills employed less than twenty-one hands and only eleven firms employed over 1,000. In the weaving, as many as 14·1 % are family establishments, and 35·5 % of the mills employ only one to ten hands. Only 2·3 % have between 500 and 1,000 workers and only 1·7 % over 1,000.

The bulk of the worsted is produced in the Roubaix-Croix-Tourcoing district, which makes 80 % of the worsted and wool-mixed hosiery and produces most of the yarns and finished goods, particularly dress goods. From French Flanders the industry spreads over the chalk divide into Picardy and Cambrésis, where dress materials are also made. A large number of small towns specialize in some type of woollen product: Sedan retains an ancient heavy cloth industry, Reims and the neighbouring villages make flannels, Orléans is the chief blanket-making centre, Châteauroux makes cloth for military uniforms; Mazamet, in the south-west Central Massif, imports sheep fells from Argentina and specializes in 'plucked wool', which finds a market in England. The skins are sent to Craulhet for the leather industry. In the valleys of Aude and Tarn, rabbit fur is used in making felt.

The post-war prosperity in the woollen industry came to an end in 1930, when the depression was further aggravated by the closing of the German frontier to French combed wool.

Linen

The linen industry still holds an important place in French textile activities. It kept its hold long in the north, largely because of particularly favourable conditions for flax growing in Flanders and for flax retting in the waters of the Lys valley (Plate 61). There has been a steady decline, however, in the growing and preparation of flax, and for many years most of the fibre was imported from Russia. The number of persons employed in the retting and scutching of flax has dropped to about a thousand, and most of the works even of the Lys valley now lie on the Belgian side of the frontier. The area under flax was lowest in 1932, in spite of state assistance to the growers. Reconstruction after 1918 gave a temporary prosperity. World-wide troubles coincided with a rise in the price of raw material owing to the decrease in flax acreage in Russia; at the same time the com-

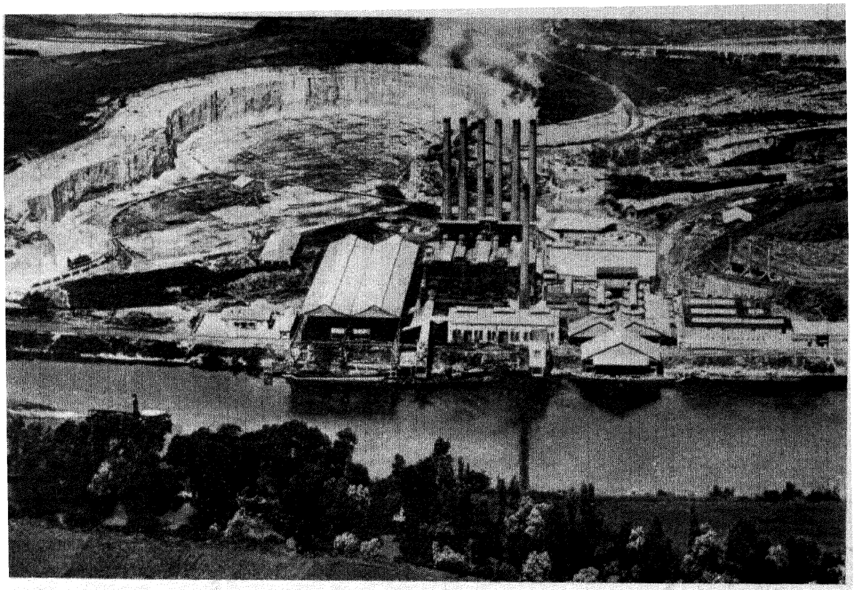

Plate 60. Cement works at Gargenville, near Mantes

Between Paris and Mantes the river Seine has cut through the Tertiary rocks which form so much of the surface of the Paris Basin to the chalk beneath. The chalk is quarried on a large scale at several works such as this. Coal (British or French) is obtained, and the lime and cement are largely sent away by river.

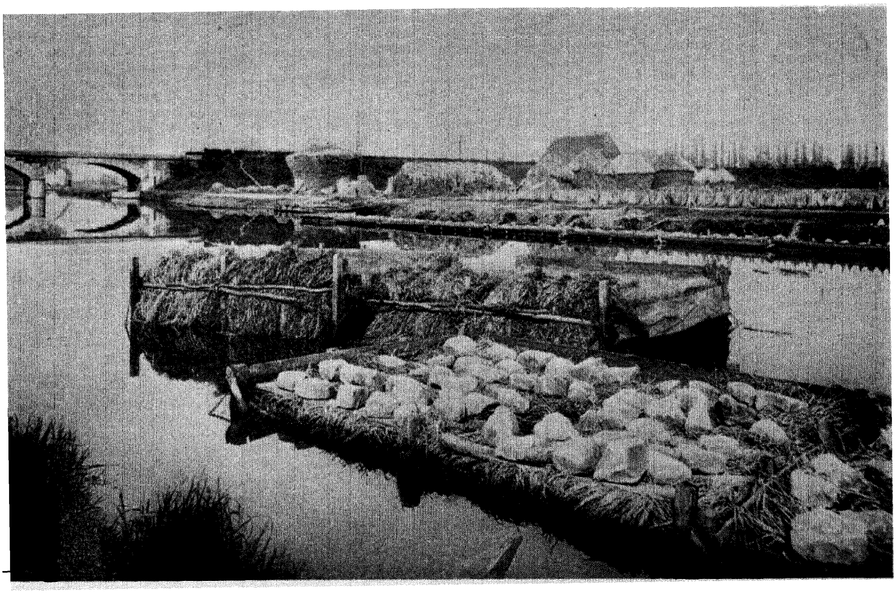

Plate 61. Flax-retting in the Lys

The operation of removing the fibres from the vegetable matter which surrounds them is performed by steeping the flax stalks in water. The harvested flax is placed in large open-sided wooden cases, which are weighted down with stones. On the bank small stooks of flax are seen drying, after harvesting and before retting.

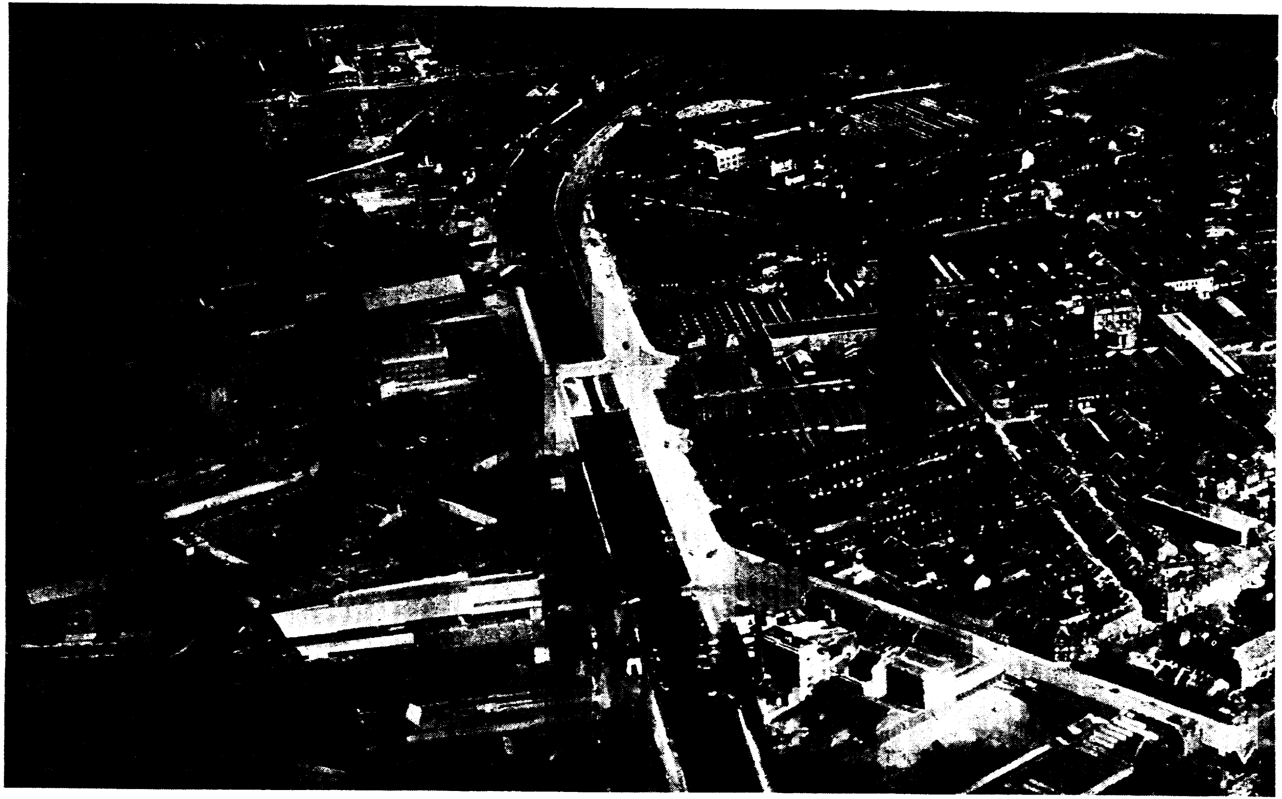

Plate 62. A section of industrial Roubaix

In the centre, the Roubaix Canal, with quays and a lock; on the left, a patent fuel factory, gas works and a coal depot, each with its own quay; on the right, numerous textile mills.

petition of cotton, jute and wool and more particularly of rayon became serious. The slump in hand embroidery caused by the introduction of the sewing machine and the unhealthy conditions of the industry were contributing causes. Flax preparation and spinning requires damp, warm conditions, and flax dust is harmful. Much of the labour employed in France comes from Belgium. There are about 600,000 flax spindles, 22,000 power looms, and it is estimated that about 18,000 hand looms are installed in cottages. Altogether 22,000 hands are employed in the spinning section. Climatic conditions confine the spinning of flax to the north of the country. Lille has four-fifths of the spindles, and the rest are distributed in French Flanders, the Somme basin, Normandy and Brittany. Cambrai, Amiens, Abbeville, Barentin (near Rouen), Rennes, Angers, Cholet and Ligugé are organizing centres. Weaving, employing about 56,000 people, is also carried on chiefly in the north. Some weaving is done in the spinning towns mentioned, and Armentières, Hallines, Bailleul, Hallencourt and Valenciennes in the north, Lisieux in Normandy and Gérardmer in the Vosges specialize in weaving (Plate 64). Goods manufactured vary from the coarsest sail cloth to the finest cambrics.

Cotton

Rouen. The cotton industry took root first in Rouen and the surrounding district and proved at once a serious rival to that of linen, which had developed along the stream valleys of the plateau of Caux, overlooking the Seine. Its dependence upon imported raw material encouraged development along the Seine waterside, and a continuous line of textile factories follows the loops of the river for a score of miles above Rouen and spreads up the valleys that converge on the town (cf. vol. IV, Fig. 14, and see Plate 63). Raw cotton is railed from Havre, which supplies practically the whole of France. Rouen is in the main a spinning district, but produces also heavy cottons, e.g. twills and cretonnes.

The North. Naturally the industry quickly established itself also in Flanders in contact with the coalfields and with an available supply of textile labour. Proximity to the coast was also a geographical asset, encouraging the manufacture of yarns for export. Lille itself specializes in the higher counts for quality piece goods such as muslins and voiles, while Roubaix and Tourcoing with Armentières use the lower counts. The hosiery and knit-wear side of the industry is centred in Roubaix (Plates 62 and 63).

Alsace. The cotton industries of the eastern industrial area are to be found in the valleys of the Vosges, in Alsace, Lorraine and the Belfort district. Calico- and muslin-printing works were set up in Alsace in the eighteenth century, and this branch has been maintained to the present day. Important technical and art schools specialize in designs for fabric-printing. The spinning of cotton came later, establishing itself as a cottage industry in the Vosges valleys and all the valleys of upper Alsace. It was not long before the introduction of steam power caused a concentration of labour on the plains in and around Mulhouse and Colmar. The valleys, however, continued to work for these controlling centres. One result of the Franco-Prussian war and the annexation of Alsace was the exodus of many Alsatian cotton masters to the western flanks of the Vosges and to the Belfort district. It was the nodal town of Epinal that organized this immigrant addition to the Lorraine textile industry. Within 30 years, 1870–1900, the population of the town rose from 8,000 to 28,000. Cotton spinning developed rapidly to feed the already established looms and calico-printing established itself at Epinal. Good communications were an important factor in this development, trans-Vosgian roads and railways and the Canal de l'Est playing their part. The St Dié region is the seat of an early Alsatian colony of 1797 which introduced the cotton industry, affiliated to parent institutions in Alsace. This facilitated the later migration after 1872.

The reacquisition of Alsace after 1918 was hardly an asset for the over-producing mills of Lorraine, but by 1920 adjustment had been accomplished.

In the St Dié district all branches of the cotton industry are carried on, down to the making up of clothing, but within the area certain centres specialize: e.g. Provenchères is a spinning and weaving centre; St Dié has hosiery and dye works; bleaching is carried on in the Raon district. On the whole, Alsace produces the higher quality yet popular piece goods—zephyrs, twills, printed muslins and calicoes and fancy goods generally—while the Vosges valleys of Lorraine manufacture coarser grades of the same types. The latter region, with St Dié in particular, makes a great variety of textiles in which cotton and silk are combined. One speciality, deriving from the former metallurgical industry, is that of metal thread weaving. It is interesting to note that, though the bulk of the Vosges inhabitants are Catholic, all the cotton workers are Protestant.

Troyes. Of the textile industry of Troyes, also established by colonies of Protestants, the revocation of the Edict of Nantes left only a remnant—the knitting industry, which later developed into the hosiery and knit-wear manufacture. Troyes is the centre of a group of small towns in the department of Aube—Romilly-sur-Seine, Aix-en-Authe, Marigny and Méry—which have knitting factories, and there is a considerable development of cottage industry using small hosiery machines.

Central Massif. A group of small centres, affiliated to St Etienne and Lyons, make cotton goods as well as silk and rayon. Such are Roanne and Thizy, which make fancy goods for dresses, shirtings and woven coloured goods, and Tarare, whose many small workshops turn out muslins, tarlatans and specialize in surgical dressings and bandages. Cholet, near Nantes, makes cotton handkerchiefs.

Employment, etc. The cotton industry employed about 192,000 persons in 1938. As in other textile industries of France, the undertakings are generally small. In 1931 the average number of persons employed per spinning mill was only 216, and per weaving unit 119. Only 10 units employed over 1,000 hands and 105 weavers employed *no* wage earners.

This results from the highly individualized nature of the industry, in which, according to tradition, novelty spells success. There is great variation in the nature of goods produced within each area and wages vary greatly. Little or no central organization has developed, though there is a cotton-conditioning office at Havre, the chief port of raw-cotton import, with a branch at Dunkirk.

The industry as a whole has not encouraged the installation of modern machinery. In 1938 only 19·5% of the looms were automatic. The small manufacturer has little capital to invest, and apart from the high cost, automatic looms are held to be unsuitable for the great variety and high specialization of the French product, which is very sensitive to changes in fashion. Also there are labour difficulties in the installation of machinery, which reduces the number of operatives required.

A large proportion of the loom machinery is manufactured in Alsace. Spinning machinery still comes from the United Kingdom. Switzerland and Germany provide the hosiery machinery and Germany the calico-printing plant.

Silk

The silk industry was started in the Rhône valley by Italian immigrés in the fifteenth century. They introduced the rearing of silkworms into Provence and Languedoc and this spread up the

Rhône valley to the plains around Lyons, accompanied by the cultivation of the mulberry tree. Sericulture was at that time a boon to the poor farmers of the edge of the plain, giving occupation to the women and children and thus making a welcome addition to the cottager's income. Silk reeling and spinning had not the same climatic restrictions as silkworm rearing, and spread from the lower to the middle Rhône valley and into the valleys and intermontane plains of Savoy and Auvergne. Radiating from its control centre at Lyons, where at first the hand-loom weavers lived and worked in the district of La Croix Rousse, in the angle between Saône and Rhône (see Plate 74), it became established in the plain between Vienne and St Rambert, in the upper Rhône valley at Bellegarde and Nantua, and in the southern valleys of the Jura—Ain and Alberine. It extended also along the Gier valley to the Loire basin at St Etienne and Roanne, where silk ribbons became a specialized product. To-day, the weaving mills are chiefly in the departments of Rhône, Isère and Ain. There are about 350 silk-weaving units in the department of Isère alone.

Although the circumstance of its initiation was historical, the persistence and development of the industry were due to climatic and social conditions encouraging sericulture, to the presence of cheap skilled labour, drawn from and utilized in the highlands, and to the swift streams of the uplands. At a later stage it depended for power on the scattered coalfields of the massif and, in more recent years, on the hydro-electricity of Alps, Jura and the Auvergne.

Sericulture, which in the middle of the last century produced annually about 12,000 tons of cocoons, has steadily declined. By 1914 the output was halved, and in spite of state encouragement, which kept the average up to 3,500 tons between 1924 and 1927, had dropped to 943 tons by 1933. By 1938 it had declined still further to 597 tons. Reasons may be found in the falling off in the rural population, in the onerous nature of the work, aggravated by the spread of silkworm disease. The competition of the products of overcrowded rural districts in Italy soon made itself felt, followed by that of Syrian and Chinese cocoons. Finally, Japan captured the French market, ousting in the past few years the Italian product. Japan is to-day the main source of floss silk. The French raw-silk production during 1935–7 was only 2% of the total amount consumed.

Lyons. Four-fifths of French silk goods are manufactured in the Lyons-St Etienne industrial area. Because of the immense variety of silk products and the susceptibility of the industry to changing

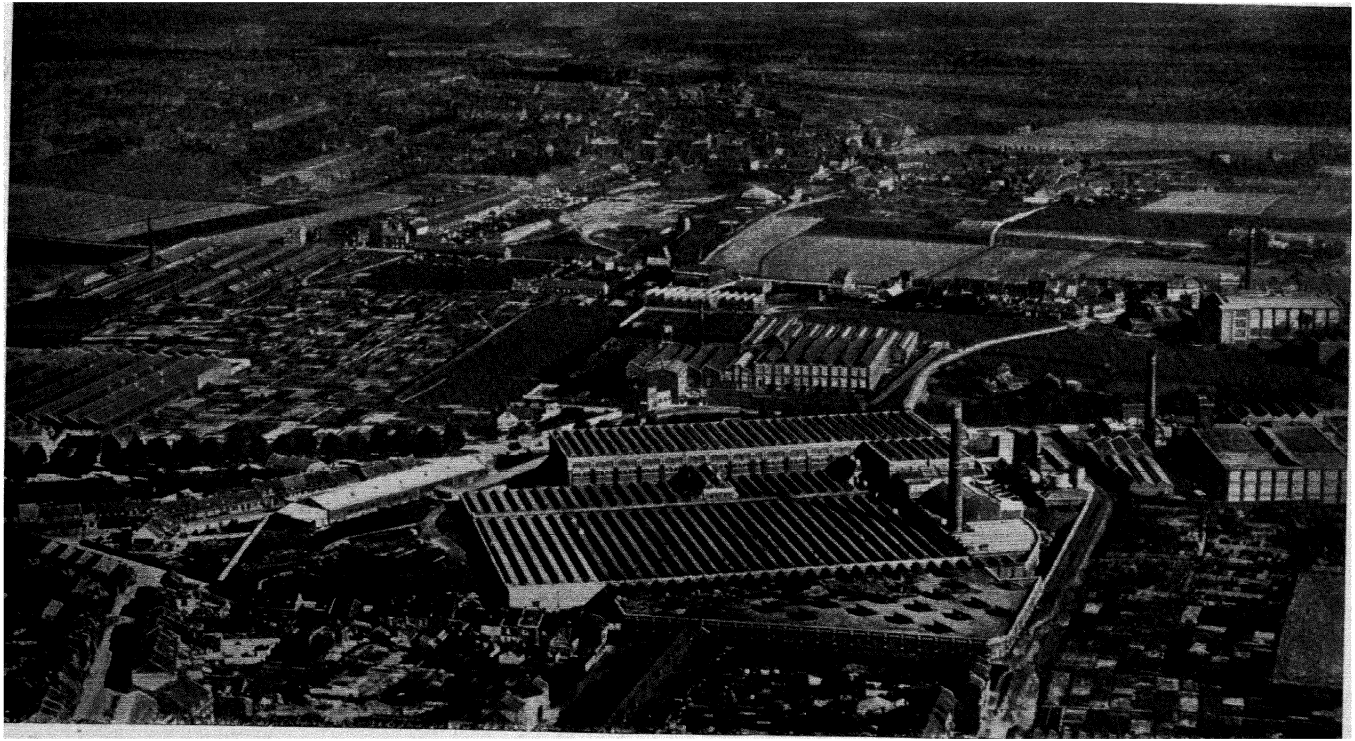

Plate 63. Tourcoing

Tourcoing, with its neighbour Roubaix (see Plate 62), is one of the most important textile centres of France. The photograph shows the outskirts of the town. In the foreground is a typical weaving mill, with serrated roof of glass; all around are workers' dwellings, allotments, and open spaces. In the distance is the cultivated plain of Flanders and a large village which has almost been absorbed by the spread of the town.

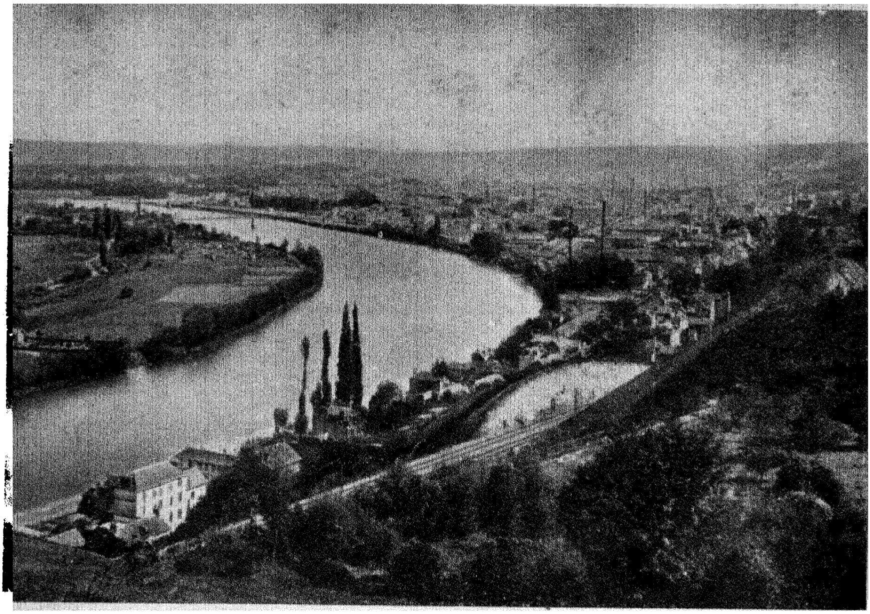

Plate 64. Elbeuf, on the lower Seine

A view looking south-eastwards, upstream, across this textile town which is situated on the concave bank of a great sweeping river meander at a point where a small tributary comes down from the chalk plateau. The many mill chimneys are a prominent feature.

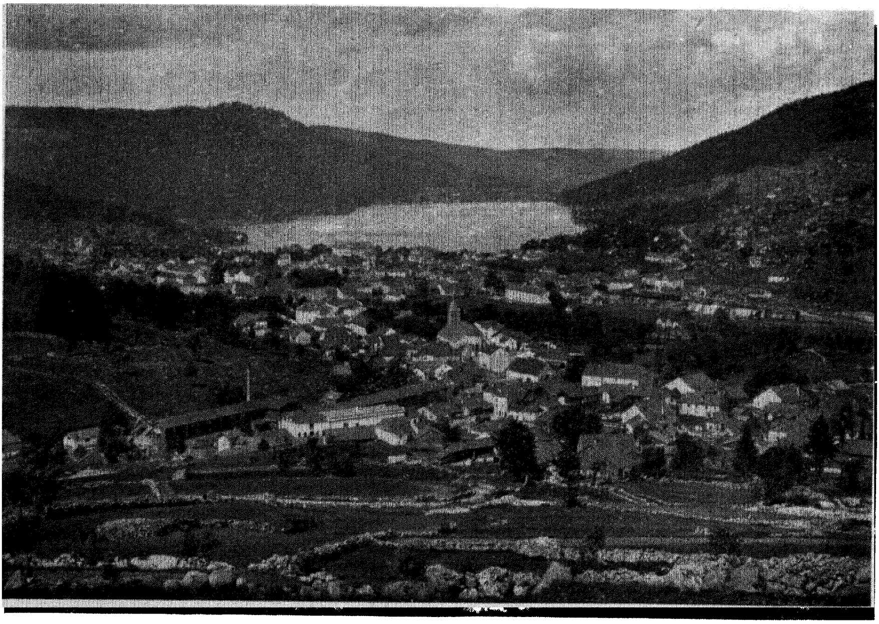

Plate 65. Gérardmer, in the Vosges

The chief centre in eastern France of the linen industry, which is conducted in small mills such as the one in the foreground, and in domestic establishments. Much of the bleaching section of the industry is located in a neighbouring valley, on meadows by the side of lake Longemer.

fashions, the tendency to dispersal has persisted (in spite of the installation of some large mills), being greatly encouraged of recent years by the supply of electricity to outlying valleys. Lyons organizes this scattered and heterogeneous production in close collaboration with the fashion masters of Paris. The cottage and small-scale units which make so much of the elaborate fancy goods are very flexible in their organization, and if work fails for a season, there are the rural occupations of pasture and forest for the peasant to fall back on. More than half those employed work in mills with less than 500 hands, and over 1,000 establishments employ fewer than 100 workers. There are about 3,800 isolated works in all.

Vosges. Some silk is manufactured in the Vosges valleys. Mulhouse employs 2,000 hands in the silk and rayon industries. Soultz has an important 'schappe' silk industry for the spinning of which silk waste from the Lyons industry is used. The thread is sent to Basle to be twisted. Silk hosiery is made at Barr.

Troyes uses locally manufactured silk and spun silk in the hosiery industry.

Rayon

In 1938, France produced 28,000 tons of rayon, and ranked as sixth among the world's producers. Within recent years, the rayon industry in France has shown signs of becoming a close monopoly; over two-thirds of the production is controlled by the *Comptoir des textiles artificiels* (*C.T.A.*). The viscose and acetate methods have now completely superseded the older preparations with nitrate and copper, which were both unsatisfactory and expensive. The viscose method was commercially exploited as far back as 1900, but owing to the mediocre quality of the products, it was not successfully established until the late 'twenties. Wood pulp for the manufacture of viscose rayon is imported from Canada and the Scandinavian countries, via Dunkirk and Rouen, thence distributed mainly by waterway. The raw material for acetate rayon is cotton *linters* (the short fibres removed by the carding machines and frequently known as 'waste' or *bourre du coton*); Havre is the main entrepôt. The acetate variety was first used during the war of 1914–18 for coating aeroplane wings, and it has come to be more extensively employed since 1920, although the costs of production are about 15% higher than that of viscose, due partly to the higher price of the raw material and partly to the loss of acetone during processing. *Rhodiaseta*, a company controlled by the *C.T.A.* and the powerful *Rhône-Poulenc* chemical combine, is the most important acetate rayon producer. Some four-fifths of the French rayon output for 1938 was of the viscose variety, while the rest was almost entirely of the acetate kind. Technically, the acetate process is the simpler, but viscose rayon products are on the whole of higher quality. The cotton and rayon industries have in recent years become closely associated, owing to the possibility of mixing the two fibres; this also applies to the fabrication of wool.

The location of the twenty-three rayon factories in use in France during 1938 is shown on Fig. 85. At first, rayon was produced in factories which had been converted for that purpose, e.g. the earlier factory at Besançon, those at Izieux, Givet, Valence and Argenteuil. Between 1920 and 1929, factories especially designed for rayon manufacture were set up, e.g. at Albi, St Aubin, St Just-des-Marais (near Beauvais), and Besançon. The largest factory is that at Vaux-en-Velin, east of Lyons, built in 1929. In the planning of modern factories, there has been an attempt to form a complete unit of the chemical and textile sections, although they usually remain slightly separated from each other.

The distribution of the rayon factories has been governed by a variety of considerations, more especially easy access to coal and ample water supplies. The presence of skilled labour, however, seems to have been a major factor where the chemical and textile works were grouped together, thus at Izieux, St Chamond and Vals there were silk industry specialists. But there has been a more recent tendency to employ a greater amount of unskilled labour. At places where male labour has been absorbed into neighbouring heavy industries (e.g. at Givet, Valenciennes, Grenoble, Colmar and Albi), the majority of the workers are women. Labour problems have often made it difficult to establish the rayon industry (both fibre and textile) at flourishing textile centres—thus there are factories at Rouen, Arques, and Colmar, but not at Flers, Elbeuf and Mulhouse. On the other hand, a depression in the textile industry, with the consequent releasing of labour, has occasionally led to the opening of rayon factories in certain areas—for example at Calais (by an English firm) and at Amiens.

More than two-thirds of the total French output of rayon is used in France. The Lyons area absorbs about one-third of this output, the St Etienne-St Chamond-Izieux centre about one-fifth; the rest is distributed mainly to Eastern France (the Vosges-Mulhouse area), to the Nord and to Troyes. Since transport costs are not heavy, rayon supplies are easily sent from the manufacturing areas to other textile centres; thus considerable quantities go from Grenoble to Troyes and from Argenteuil to Lyons.

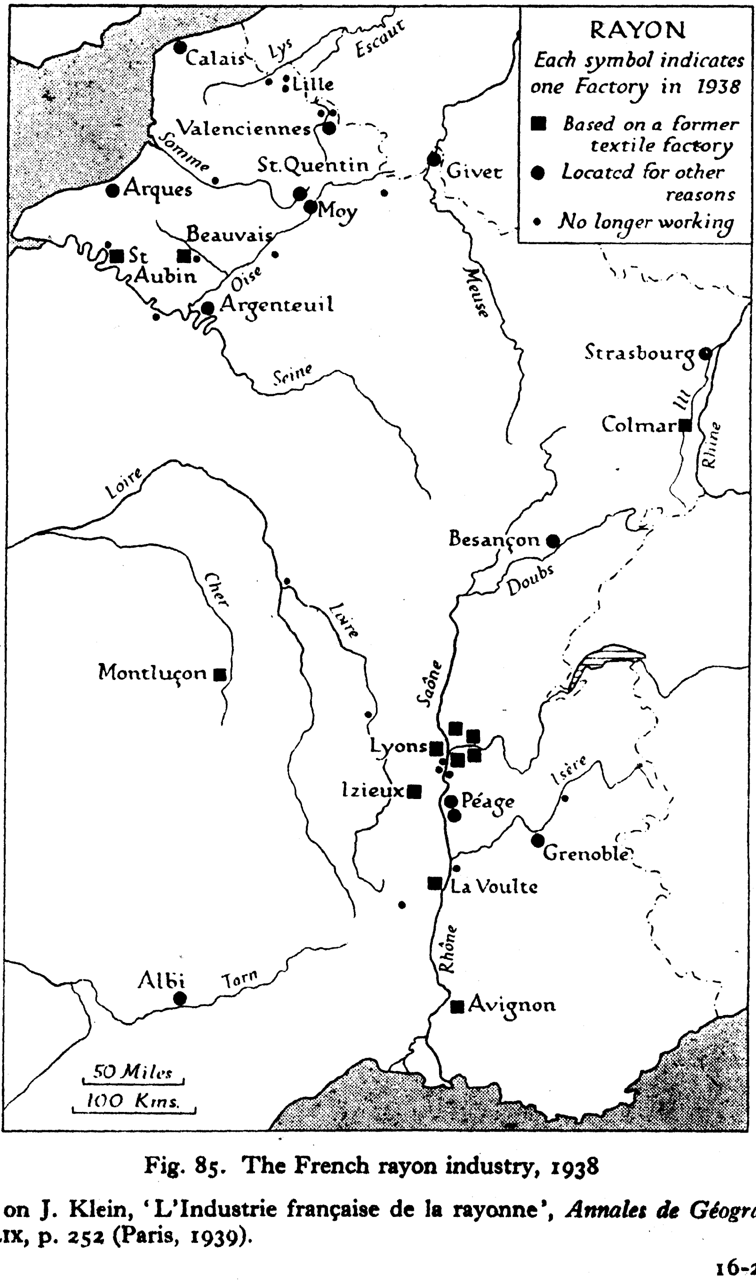

Fig. 85. The French rayon industry, 1938

Based on J. Klein, 'L'Industrie française de la rayonne', *Annales de Géographie*, vol. XLIX, p. 252 (Paris, 1939).

MISCELLANEOUS INDUSTRIES

Watch and Clock Making and other Industries of the Uplands

The cottage industries of the Jura and Vosges were based originally on wood carving and cabinet making and the fabrication of household furniture, utensils and toys, which gave occupation for the long winter evenings. The necessary soft wood was plentiful on the valley slopes. In the Jura the hard boxwood was used for the special craft of pipe and comb making. The making of clock cases became a speciality for the market, and in the eighteenth century the immigration of Swiss political refugees taught the natives the craft of watch making. In modern times the introduction, also from Switzerland, of the use of standardized watch parts has resulted in something like mass production in the Montbéliard district, where they are assembled, although the parts are still made in the valley workshops and small factories. The industry is carried on throughout the upper Doubs basin where there are about 100 manufacturers of watch sections. Besançon is the main centre of the industry. Water power, and later hydro-electric power, have played an important part in the industry as in the textile and engineering activities of the region.

In the southern Jura, the exhaustion of the boxwood supplies led to the importation of Mediterranean heath roots known as 'bruyère'. In their finished form they appear in England as the well-known 'briar' pipe. St Claude in the High Jura is the centre of this industry. In the Vosges forests and in the Argonne and elsewhere a number of small industries are dependent on the timber—charcoal burning, sawing, cooperage, paper, sabot and furniture making and the fashioning of toys of all sorts.

More highly skilled work, such as the making of instruments of precision, the cutting of precious and semi-precious stones, the making of optical instruments, etc., is carried on in the neighbourhood of Geneva in the Pays de Gex.

Hides and Skins: Leather and Glove Making

The preparation of hides and skins is widespread in the cattle-rearing districts of France, particularly where oak, holm oak and chestnut forests provide the necessary tanning bark. It is carried on in the Central Massif in the departments of Cantal and Allier, on the Plateau of Millevache, where goose skins as well as lamb skins are prepared and sent to Poitiers to be dressed. Marvejols, on the Lot, prepares sheep skins from the Causses. Millau early specialized in the preparation of lamb and calf skins, and later developed a glove industry. The holm oak of the Cévennes is used in tanning, and calf leather is exported to England and America. A tanning and strap-making industry has also grown up in the Barrois, where the Kimmeridge clay vale has good cattle pasture. Paris has its leather works in the Ivry-Vitry district and specializes in high-grade boots and shoes. In Hautes-Pyrénées, Tarbes is the chief tanning centre for the kid and lamb skins of the mountain pastures. It specializes in patent leather and sends prepared kid and lamb skins to Grenoble and Millau for the glove industry. Marseilles is a large importer of hides and skins which it distributes and processes. Lyons is the regional centre of a widely distributed leather industry, collecting and distributing hides and skins and manufacturing finished articles. Romans, with its large boot and shoe factories, comes into its radius. The most important glove-making centre is at Grenoble, which uses lamb skins of high quality from the Alps and from the Causses and Angoulême. Large quantities of egg yolk, imported from China, are used in the softening of the leather. The sewing of the gloves is done by women, of whom about 15,000 are employed. This is still largely a home industry.

The Vichy Regime

Although industry is widely scattered in France, the major industrial areas are in the north and east, that is, in the zone occupied by Germany in June 1940 on the cessation of hostilities. Of twenty-seven departments which have less than one-fifth of their working population engaged in agriculture, twenty are in occupied France, forming a solid block in the north and north-east. Paris, the biggest industrial centre in France, is in the occupied zone. The most important coalfield, the great ironfields and most of the iron and steel works are in the occupied area, as are most of the machine-tool works, four-fifths of the aeroplane and automobile factories, nearly all the locomotive works, two-thirds of the shipbuilding yards, most of the electrical machinery factories, most of the great petroleum stores and refineries, and most of the textile factories other than those which manufacture silk and rayon. While armament production is widely dispersed, there is a considerably greater number of units in the occupied zone. Thus quite apart from Alsace-Lorraine, the industries of which have been effectively incorporated into the economic organization of the Reich, the bulk of French industry is in German hands.

The only important industrial areas in unoccupied France are in the neighbourhood of Lyons and of Marseilles. The unoccupied zone possesses nearly all the developed hydro-electricity, most of the

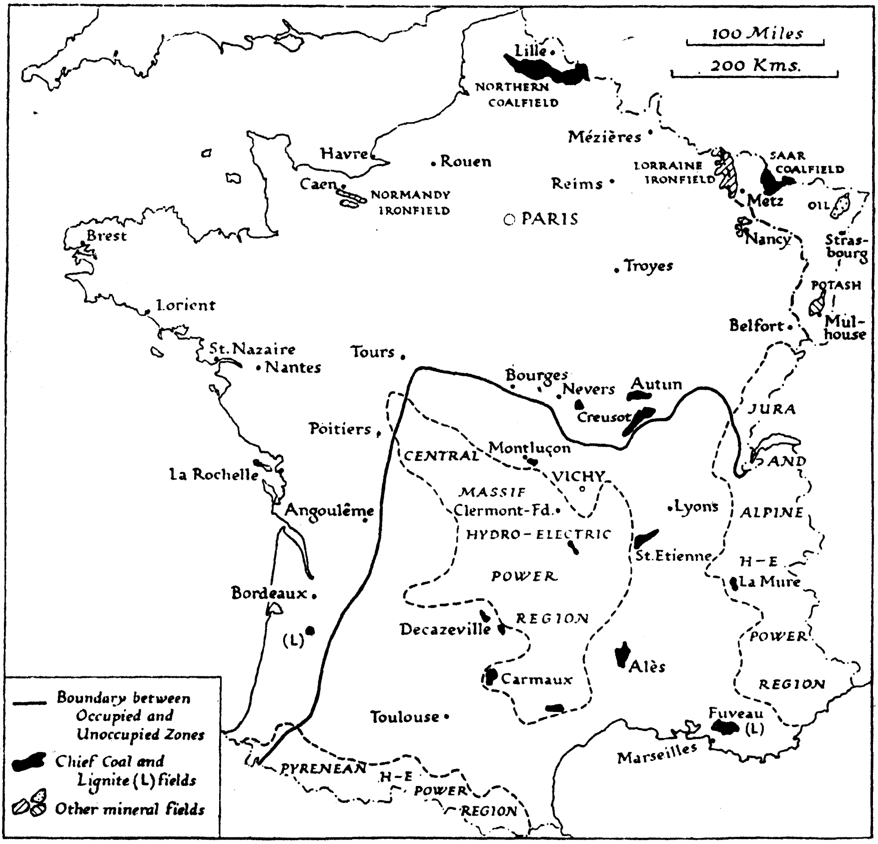

Fig. 86. Industrial France in relation to the Armistice Line

In addition to the line dividing the Occupied and Unoccupied zones, the frontier of Alsace-Lorraine is shown. The chief mineral and power resources are indicated and some industrial towns are named.

electro-chemical and electro-metallurgical industries, certain other chemical industries such as soda and soap manufacture, paper-making industries in the Alps and Cévennes, and the silk and rayon manufactures of the Lyonnais. The only important heavy industrial centres in the unoccupied zone are at St Etienne, Clermont-Ferrand and Montluçon.

German policy towards French Industry (*see also p.* 344)

Immediately after their victory in June 1940, the Germans pursued a policy of industrial pillage and spoliation; large quantities of machines, tools and scrap were immediately removed to Germany. French industrial activity was for a time completely disorganized. But German economic policy was, from the outset, not wholly predatory. It was also concerned with the task of determining which factories in the conquered areas could be operated to help the German war effort. An organization known as the *Wehrwirtschafts und Rüstungstab Frankreich* (or *Wiraü*), linked closely with the big industrial combines in Germany and working under direct orders from Göring, made during the autumn of 1940 a census of all French factories, equipment, etc. which might be used to further Germany's war effort. It worked in association with the German military administration to further the coordinated organization.

Thus gradually the industries of occupied France, largely supplied with raw materials by Germany (i.e. mostly out of French stocks previously requisitioned), have been reorganized to a considerable extent for repair and maintenance, for the production of component parts, and for the actual construction of finished armaments for Germany's needs. In September 1940 all industrial firms within occupied France were ordered by the German authorities to carry on; if they were unable to do so, the Germans in many cases put in a manager. Factories in the north-east, abandoned during hostilities, were started as soon as possible either by the French-owning companies under German supervision or by German firms. In Alsace-Lorraine, industrial enterprises were incorporated into the economic regime of the Reich. The idea of 'economic collaboration' between Germany and France was implemented by numerous agreements. The first of these agreements in December 1940, between the German and French synthetic textile producers, was followed by others, starting with iron and steel and gradually extending over the whole industrial field. German economic organizations in Paris included the *Verbindungstelle Frankreich*, a development of the former German Chamber of Commerce. Unoccupied France was in urgent need of work and of raw materials, and these could often be obtained only if factories executed German orders. In October 1940 a Central Contracts Office was established in Paris to control and co-ordinate sub-contracts which German manufacturers were passing on to French industry, not only in the occupied but also in the unoccupied zones. This organization represented an extensive control of French industry by the German authorities, and was still operating in April 1942.

The idea of collaboration gradually became more definitely expressed. In September 1941 representatives of the French Chamber of Commerce and the *Verbindungstelle Frankreich* met in conference in Paris. Their aim was to search for possible adjustments in the economic sphere between the two independent administrations of France and Germany. It was stated that collaboration meant that the economies of each country should be linked up, that state direction of all the forces of production in France was needed, and that private initiative must harmonize with the interests of the national economy. Industrial fairs, well attended by German exhibitors, were held during the autumn of 1941 at Paris, and in the unoccupied zone at Marseilles, Lyons, Bordeaux and Toulouse. A branch of the *Verbindungstelle Frankreich* was opened at Lyons; this was significant because until this date Franco-German collaboration had stopped at the demarcation line.

The industrial policy of the Vichy Government

The Vichy government was obliged to face an immense problem of restricted reconstruction. At first the government, expecting the early conclusion of general hostilities, formulated schemes for the independent recovery of French industry. Gradually it was realized that Germany was controlling industry directly in occupied France, and to an increasing extent, although more indirectly, in unoccupied France, and that any industrial recovery was to be subordinated to Germany's needs. In July 1940 the government drew up its first programme of economic reconstruction. This included the rebuilding and electrification of large sections of the railways, and reafforestation to provide timber for wood-pulp and charcoal for producer-gas. Provisional short-term advances were made to industrial enterprises to enable them to resume work. In September 1940 far-reaching changes in the industrial organization were made by the creation of *ad hoc* Professional Organizing Committees (*Comités d'Organisation*) nominated by the government in each industry, with very wide powers to control the distribution of labour and raw materials, and to fix prices. A Central Office for the distribution of industrial products was set up, divided into ten sections, which allocated raw materials to industry on the basis of a percentage of previous consumption. Hours of work well below the general maximum were fixed in order to absorb excess labour, and overtime payments were discouraged. In the same month the government provided 500 million francs to be expended on public works. There was a general drive to produce substitutes, especially for textiles, rubber and leather, to economize in fuel, in steel and in raw materials, to collect scrap, waste paper, etc and to curtail the manufacture of all products other than essentials. In June 1941 an industrial 'Ten-Year Plan' was formulated; it aimed at the exploitation of the industrial capacity of France within the European system.

Shortage of Raw Materials

The great problem of French industry was the shortage of raw materials, and even those factories which were working on German orders were eventually affected by it. Stocks of scarce raw materials in the occupied zone had been requisitioned by the Germans, and by the autumn of 1941 stocks in the unoccupied zone were exhausted. The greatest shortage was that of fuel. It became obvious that industry must be concentrated and raw materials allocated according to a strict scale of priorities. The Minister of Industrial Production was given power by a law of December 1941 to shut down small factories and to concentrate production according to the national interests. A plan was produced to use France's limited stocks of raw material in the most economical way. It was stressed that this plan was only temporary and that it did not aim at permanent concentration and rationalization. The most efficient factories were to continue production. The nucleus firms were to pay an allowance to the closed firms to cover overhead costs. Concentration was applied first to the textile industry, which had been the worst sufferer from shortage of raw materials.

Labour Problems

The absence of more than one in three of the French male population between 20 and 40 in German prison camps is a factor which has had a crippling effect upon many aspects of the economic life of the country. In 1940 there were estimated to be 1,800,000 French prisoners of war; it was inevitable that German concessions in releasing them should demand the price of increased 'collaboration'. There has been some repatriation, especially to supply industrial labour for Germany in occupied France, but the great majority, some 1,270,000, were still prisoners in April 1942. Nevertheless, except for the absence of certain skilled workers and especially of miners, the shortage of so much labour has not hit French industry as badly as agriculture because of the greatly reduced industrial activity. Unemployment consequent upon the closing of factories was therefore not as marked as might have been expected. In October 1940 there were about a million unemployed, of whom some 60% were women. By October 1941 the total had been reduced to 230,000. This decrease was due partly to the fact that as far as possible the industrial work available was 'spread over' so that many factories were working short time. In December 1941 official unemployment figures for all France were 202,530, of which 97,000 were in the department of Seine, but in March 1942 the total had decreased to 166,000, of which 57,700 were in the Paris region.

By March 1940 about 140,000 workmen from France were employed in German industry; of these, however, only some 25–30% were French. German pressure on Vichy to supply more industrial labour for Germany from the unoccupied zone steadily increased. In the spring of 1942, a great drive was made for the recruitment of 350,000 French workers for Germany, but in spite of enforced concentration of industry which threw men out of work, comparatively little success was achieved. By July 1942, it was estimated that about 175,000 workers from France were employed in Germany; of these about 133,000 were French.

A new scheme of social order, on a semi-corporativist basis, was planned by a mixed Committee for Professional Organization, constituted (in March 1941) from representatives of employers, technicians, artisans and employees. This Committee drafted a 'Statute of the Professions', which dealt with the relations of capital and labour and with the general lines of social-economic organization, apparently something in the nature of the Italian *Carta del Lavoro*. The final text of this *Charte du Travail* appeared in October 1941, and dealt with all workers except Civil Servants and the liberal professions. 'Professional families', membership of which was compulsory, were set up; they included all people in the same occupation. Within this grouping were three separate unions of employers, technicians and workers. Social committees, containing representatives of the three groups, were set up within each large factory, district and region, while a national Social Committee represented the whole 'profession'. The local social committees had power to deal with wages, training, dismissal, recruitment, etc. Strikes and lock-outs were forbidden, and all industrial disputes were to be settled by Labour Courts. Gradual application of the Charter was carried out throughout 1942. It met, however, with a comparatively unfavourable reception, and while being accepted in principle it was opposed in detail by most sections of the community.

Meanwhile the French trade union confederations and local unions continued to exist, although the national federations were dissolved in September 1940. Attempts have been made in both zones to achieve working-class unity, but much division of opinion remains. Resistance to the German occupation is strong among the workers.

Survey of Industries

Coal (see pp. 179–89). The country in pre-war years consumed from 70 to 75 million metric tons of coal annually, of which about 7 million tons came from the Lorraine mines now closed to France, and about 25 million tons from abroad. Three-fifths of the home-produced coal came from the northern coalfield, but owing to the speed of the military decision relatively little damage was done to the collieries. In August 1940 it was reported that the Pas-de-Calais mines were practically undamaged, that the surface buildings of a few mines in the Nord had been destroyed, and that a few pits had been flooded by the French. Some resumed work in July and August at a reduced rate. The first trainload of coal since the Armistice was sent to Paris on 16 July. By the end of 1940 most of the northern collieries were working once more, but only very small amounts were sent to the unoccupied zone. The acuteness of the fuel problem, however, was due chiefly to the complete cessation of imports, which formerly supplied one-third of the country's needs. As a result, there was a great shortage of domestic coal during the winter of 1940–1. There was some improvement in the summer of 1941, but the problem increased with the cold winter of 1941–2, with the exhaustion of private stocks and with the failure to secure German deliveries from the Ruhr or from Belgium. Although the mines in unoccupied France produced 30% more coal than before the war, total production in the whole of France in 1941 was estimated to be about 40 million tons, i.e. between 80 and 90% of the pre-war total; this, however, represented only half of the normal consumption. Requirements in some cases increased, owing to the consumption by the army of occupation; this was estimated to be about 2 million tons annually. Because of German military transport the railways had been able to reduce their total consumption by only a small amount, although passenger services were less than one-third of normal.

Rigorous rationing has been in force in both zones; domestic supplies were less than half normal in 1940 and in 1941. Industry (except those factories working to supply German needs) obtained about half its normal requirements in 1941. The government was finally obliged to shut down for a fortnight over Christmas and New Year 1941–2 all undertakings consuming more than 20 tons of coal monthly; this closing did not apply to food factories and to public utilities, and most factories working on German supplies continued operations.

Electricity (see pp. 215–23). The division of France into two zones disorganized the distribution of the electricity supply of the country, as the unoccupied area possessed nearly all the hydro-electric installations. The high-tension grid supplied a large part of the current consumed in northern and western France from the hydro-electric stations in the Central Massif, in the Alps and in the Pyrenees; the main stations in occupied France are thermal. The importance to unoccupied France of hydro-electric power was emphasized by the shortage of coal. Works of reconstruction were put in hand by the government; work on the dams at l'Aigle on the Dordogne, Haut-Vic near Luchon, Eylie in Ariège, St Etienne-Coutelès on the Serre, and Génissiat on the Rhône was continued. These schemes were intended to compensate for the loss of thermal supplies. So great was the dependence on hydro-electricity that when in November 1941 supplies had to be restricted because of the exceptionally dry September and October, supplementary thermal stations had to be used to maintain a continuous supply of current.

Oil (see pp. 228–30). In 1938 France consumed every month on an average 213,000 metric tons of motor fuel, including 9,000 tons of alcohol, and in addition about 175,000 tons of heavy oil; almost all of this was imported. After the Armistice stocks amounted only to about 250,000 tons of petrol and 150,000 tons of heavy oil, and imports ceased completely. Consumption was cut drastically, alcohol production was stimulated to 10,000 tons per month in 1941. State-sponsored efforts were made to exploit the small oil deposits near St Gaudens in Aquitaine, and large quantities of wood were converted into charcoal from which producer-gas was manufactured. It was estimated that from these various sources the equivalent of 170,000 tons of petrol and 35,000 tons of heavy oil, that is, 4–5 % of pre-war requirements, would be produced during 1942.

Iron and Steel (see pp. 189–207). Before the Armistice, the industries of eastern France had been adversely affected by the government policy of abandoning collieries, mines, and furnaces which lay in and around the Maginot Line, and of moving vital engineering industries to supposedly safer localities.

In north-eastern France, the German frontier was moved forward to the line it occupied before 1918, and the department of Moselle was thus incorporated in the Reich. Lorraine became once more an integral and complementary part of the great Moselle-Rhine-Ruhr industrial area. The iron and steel works were handed over to 'trustees' chosen mainly from those German concerns which had been in operation in Moselle before 1918, and German managers were appointed. In the department of Meurthe-et-Moselle, however, the concerns remained French property. By the spring of 1941 most of the damage done to mines, coke ovens and furnaces had been repaired, and ore production had reached the level of consumption by the local furnaces.

The heavy industrial areas in unoccupied France at St Etienne, Clermont-Ferrand and Montluçon functioned on a much reduced scale due to shortage of coal and ore. Some steel making in the Central Massif was carried out in electric furnaces, but amounts were small. For a time the works used stocks and scrap, but by November 1941 these sources were almost exhausted and France could count only on her own output of raw steel to stave off a general fall in production. Some appreciation of the situation may be obtained from the fact that the minimum normal steel requirements for the whole of France were about 230,000 tons monthly; in the spring of 1941 only 145,000 tons monthly were available, and by autumn the figure had sunk to 110,000 tons. Some of this was used for executing German contracts, not only in the occupied but in the unoccupied area. In October 1941 Germany agreed to deliver all the iron and steel necessary for the orders placed in France. But even so the shortage of coal and ore was so acute that steel quotas to industry were drastically reduced, and blast furnaces were closed down.

Metallurgical Industries (see pp. 212–5). Both raw steel and non-ferrous metals became increasingly scarce. Except for aluminium, some lead and a little zinc, France normally imports all her non-ferrous metals. The first of these, the ore of which (bauxite) is mined in the department of Var and smelted electrically, was used to a large extent on manufactures for Germany or sent there direct. Many of the existing stocks of these metals were commandeered under contract by the German authorities, so as to safeguard the execution of their orders by French firms. Scrap was collected in both zones from public authorities, business firms and private individuals; even the state contributed bronze ornaments. At first voluntary, the collection became compulsory for all non-essential articles in September 1941.

By the end of 1941 the situation had become so bad that a large number of factories, except in those branches of industry connected with German orders, closed down. By January 1942 it was expected that stocks of copper, lead and tin would run out at any time. It was hoped to obtain small quantities of manganese, tin, cobalt, zinc and lead from Morocco, to reopen old copper mines in Aveyron with modern equipment, and to intensify aluminium production. The 1938 aluminium output was about 3,780 tons monthly; in August 1941 it reached 5,000 tons and was expected to reach 7,000 tons in the spring of 1942. But nearly all (about 60,000 tons out of the estimated 70,000 tons produced in 1941) was sent to Germany or used in France to supply German orders.

Shipbuilding (see pp. 207–11). The majority of French shipyards are on the Channel or Atlantic coasts, and therefore in German hands. They worked at normal capacity on constructional and repair work, and were supplied with raw materials by Germany. The only active yards in unoccupied France were at Toulon and Marseilles, and these were not fully occupied.

Locomotive and Rolling Stock Industry (see pp. 211–2). Most of the firms engaged in the construction of railway material were situated in occupied France. The only large locomotive works in the unoccupied zone was at St Chamond near St Etienne. Locomotive repair shops in unoccupied France were at Oullins, Arles and Nîmes (P.L.M.) and at Périgueux (P.O.); the whole of the Nord, Est and État repair shops as well as the P.L.M. works at Nevers and the P.O. works at Tours and Ivry were under German control. There was a great shortage of locomotives and rolling stock. It was stated in the Vichy Press in September 1940 that under the Armistice clauses one-third of the total rolling stock was being used for the need of the German Army of Occupation. Approximately 150,000 trucks and 3,000 locomotives were in German hands. The S.N.C.F. placed big orders for locomotives with the industry, but there was no information of any deliveries in 1941.

Automobile and Aero Industry (see p. 212). The great centre of this industry is at Paris, and before the Armistice the main factories (Renault, Citröen, Ford, Peugeot) had largely turned over to the production of tanks, armoured cars and aircraft parts. They continued activity under German direction. The Bugatti works at Molsheim in Alsace were acquired by the German firm of Mercedes.

Armaments were produced in unoccupied France only by German permission; this is only granted where production is on German behalf. In the occupied zone the factories were put under direct German control.

Textiles (see pp. 233–43). Although widespread, a large part of the textile industry is in occupied France, chiefly in the north-east and in Alsace. The whole industry suffered acutely from a shortage of raw materials, once existing stocks were consumed. Deliveries of raw material and artificial fibres to the occupied zone were much below requirements, and the shortage of wood pulp and chemicals restricted rayon output in the unoccupied zone. A Franco-German company (*France-Rayonne*) was formed to produce artificial fibres, using German methods. Textile manufactures steadily decreased during 1941, and by January 1942 the industry in both zones was working at about 30% of its 1938 level. It was threatened with further decrease in activity, except for the linen industry, which had deliveries of flax from northern France.

The Alsatian textile industry worked on its stocks of raw materials for the first months of the occupation, and some companies even declared their usual dividends for 1940. But when stocks were exhausted, the scarcity of raw materials and the difficulty of adapting machinery to the use of substitutes considerably reduced production.

Leather (see pp. 244–5). This industry has suffered more than most from shortage of raw materials; home produced hides and skins were in short supply owing to war losses, and to heavy German requisitions, while the large importation almost ceased.

Chemicals (see pp. 223–8). The great potash mines and works of Alsace, which were a French state monopoly, were taken over by German industrialists, and they were in full production by the end of 1940. Shortage of raw materials caused many factories in unoccupied France to close. Some soda and soap works were in operation at Port-de-Bouc and in the Marseilles area. The most important development in the industry was the founding of a great chemical and dye company, *Francolor*, financed by the German *I. G. Farbenindustrie*.

BIBLIOGRAPHICAL NOTE

(1) The historical background of French industrial development is fully dealt with by J. H. Clapham in *The Economic Development of France and Germany, 1815–1914* (4th ed., Cambridge, 1936).

(2) General geographical and economic aspects are discussed in chapter XIII of H. Ormsby's *France: A Regional and Economic Geography* (London, 1931). The French geographical periodical *Annales de Géographie* (Paris, quarterly) has occasional articles on industries and industrial towns; but the only considerable monograph on any individual industrial area is A. Sòmme, *La Lorraine Métallurgique* (Paris, 1930).

(3) Statistical sources include (*a*) the *Annuaire Statistique* 1938 (Paris, 1939) for data of occupations, power supplies, etc., and (*b*) the *Statistique de l'industrie minérale* 1936 (Paris, 1938) for all matters relating to minerals. Useful summaries of the major industrial activities within each department of France will be found in the volumes of the industrial and commercial directory known as the *Annuaire Didot-Bottin* (Paris, annual).

(4) The reports on *Economic Conditions in France* issued by the Department of Overseas Trade contain useful information on industrial conditions and developments. The latest is dated 1934 (H.M.S.O. London, 1935).

(5) A most valuable series of industrial maps—the *Cartes Industrielles*—giving the location of all factory establishments, is issued by the Société de Documentation Industrielle (see vol. I, p. 249 of this Handbook). Industrial distributions are also dealt with on Plates 43–49 inclusive of the French National Atlas (Paris, 1933–8) (see vol. I, p. 245 of this Handbook).

Chapter VI

COMMERCE*

Foreign Trade: Introduction; Import Trade, 1938; Export Trade, 1938; Direction of Trade, 1938; Commercial Policy
Mercantile Marine: State of the Mercantile Marine; Government Aid to Shipping
Finance: The Budget; National Debt; Currency; Banking and Credit
General Economic Situation: Economic Affairs, 1919–39; Unemployment; Economic Conditions under the Vichy Regime
Bibliography
Tables

FOREIGN TRADE

INTRODUCTION

France ranks as the fourth most important trading nation. The total value of French imports and exports follows those of the United Kingdom, U.S.A. and Germany, and exceeds the values for Italy and Japan. In *per capita* value of imports and exports, France again ranks fourth among the nations, being surpassed by the United Kingdom, Belgium and the Netherlands, and standing at a figure roughly equal to that for Germany. With her considerable home production in agriculture, France is clearly less dependent upon foreign trade than such highly industrialized countries as the United Kingdom and Belgium. Nevertheless, a considerable foreign trade is inevitable. Besides offering the normal demand of an industrialized country for raw materials, France is bound to import a heavy tonnage of coal. These imports are paid for by exports of high quality, both agricultural and manufactured, and by an enormous export of iron ore from the Lorraine ore fields. Further, lying adjacent to the most highly industrialized regions of Europe, France, like her neighbours, engages in an exchange of manufactures and semi-manufactures arising from an intensive specialization and division of labour.

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* Note the following: (1) Throughout the following account the Belgium-Luxembourg Customs Union is referred to as 'Belgium'. (2) For measurements of weight metric tons are employed and are referred to as 'tons'. (3) As many of the figures in tables have been 'rounded' or have been approximated to one place of decimals, some of the totals will be found to differ slightly from the sum of the items. (4) The latest available statistics have been employed: these are generally for the year 1938, rarely for 1939; for some returns statistics for 1937 have had to be employed. (5) Figures of French trade quoted refer to 'special trade' (Commerce Spécial) and not 'general trade' (Commerce Général). The former category covers exports of the produce of France and imports for consumption within France.

Certain items in the French foreign trade account for some of the largest commodity movements in the world. France imports more coal and exports more iron ore than any other country, and is the second largest importer of petroleum. Natural phosphates, oilseeds, maize, rice, timber and wood pulp account for further heavy shipments.

Per Capita value of Imports and Exports Combined
(old U.S.A. gold dollars)

Year	United Kingdom	U.S.A.	Germany	France	Belgium	Netherlands
1929	189·0	73·0	95·0	106·1	215·0	218·0
1934	68·2	17·5	30·0	38·3	87·0	80·8
1935	71·3	19·4	29·7	34·1	81·4	74·4
1936	78·2	22·0	31·7	34·7	94·0	76·4
1937	90·8	28·6	40·0	37·4	121·2	100·8
1938	81·0	22·7	37·7	31·0	101·7	91·6

From *Statistical Yearbook of the League of Nations, 1938–9*, pp. 218–9 (Geneva, 1939).

French imports consisted for the most part of raw materials for industry—nearly 60 % by value—followed by foodstuffs—over 25 %—while manufactures make up barely 15 %. Of the exports, manufactures amounted to just over half the total and raw materials to one-third.

Imports and Exports, values in thousand million of francs

	1937	1938	Percentage of total in 1938
Imports:			
Raw materials	25·2	26·9	58·3
Foodstuffs	10·7	12·5	27·1
Manufactures	6·5	6·7	14·6
Total	42·4	46·1	100·0
Exports:			
Manufactures	12·1	16·4	53·5
Raw materials	8·4	9·8	32·1
Foodstuffs	3·4	4·4	14·4
Total	23·9	30·6	100·0

Balance of Trade

In 1938 the total value of French imports was 46,064 million francs, against an export value of 30,590 million francs. The visible adverse balance of trade thus amounted to 15,474 million francs, the second highest figure in the past fifteen years. The relation between imports and exports since 1924 may be summarized as follows:

Values in millions of francs

	Imports	Exports	Balance	
			Exports over imports	Imports over exports
Average for five years, 1924–8	50,196	51,100	904	—
1929	58,221	50,139	—	8,082
1930	52,511	42,835	—	9,676
1931	42,206	30,436	—	11,770
1932	29,808	19,706	—	10,102
1933	28,431	18,474	—	9,957
Average for five years, 1929–33	42,235	32,318	—	9,917
1934	23,097	17,850	—	5,427
1935	20,974	15,496	—	5,478
1936	25,414	15,492	—	9,922
1937	42,391	23,939	—	18,452
1938	46,064	30,590	—	15,474
Average for five years, 1934–8	31,588	20,675	—	10,914

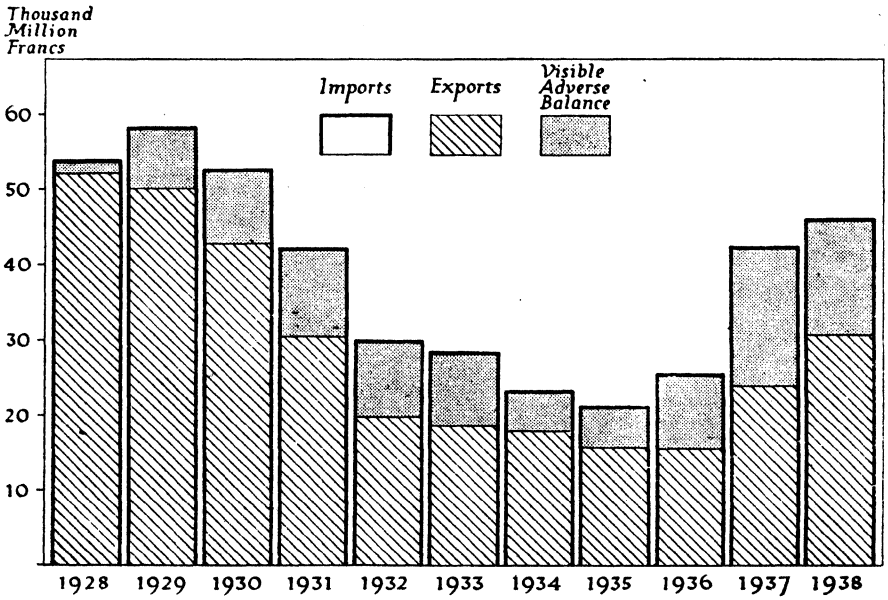


Fig. 87. Imports, exports, and the balance of trade, 1928–38

From *Tableau Général du Commerce Extérieur, 1938*, p. 34 (Paris, 1939).

In 1928 and 1929 trade was prosperous. In relation to the volume of trade the adverse balance of trade was small; in succeeding years it was much greater. The decline in the volume of trade in the middle of the period is emphasized in the diagram by the lower prices then prevailing.

It must be remembered that these figures reflect changes in price levels as well as changes in quantities of goods, but they are sufficient to show a considerable increase in the adverse balance of trade since 1927. The situation arose largely from the fact that with the world economic depression, while prices of imported foodstuffs and raw materials declined considerably, the ability of foreign countries to take French exports declined much more. Following the depression the number of obstacles to French exports, as those of other countries, increased.

Balance of Payments

The visible adverse balance is typical of the trading position of any advanced country with investments and business dealings abroad. France differs from England, however, through the great importance of the tourist trade as an invisible *export*. An invisible *import* is the quite appreciable sum which the foreign workmen in France send as remittances to their homes. This item is largely self-adjusting, however, for the value of remittances can only become large when France is prosperous. In most years the visible adverse balance is offset by the invisible exports—profits from the tourist trade, interest on overseas investments, profits from financial operations such as insurance, and earnings of the mercantile marine—and in years of average prosperity France enjoys a net favourable balance of payments. As a rule, the invisible exports decline in times of world depression.

As far as it could be estimated, the first half of 1939 was a period of improvement in the French balance of payments. The commercial deficit of the year before had already been reduced by more than 1,300 million francs (of 1928), and the number of foreign tourists in France was 30% greater than the number in the corresponding period of 1938.

Tourist Trade

In 'good' years the tourist trade becomes the chief item among the invisible exports, but, like most forms of invisible exports, it has the drawback of being dependent upon world prosperity and therefore of declining during periods of depression. In recent years the maximum number of tourists visiting France was 1,900,000, in 1929. Since then the number has declined, reaching a minimum in 1934 and 1935, and showing a partial revival in the following years (see table, p. 262).

The Balance of Payments, 1921–38 (*millions of francs*); *reduced to* 1928 *francs*

	Mean annual 1921–6	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938 (estimate)
CREDIT ITEMS:													
Insurances, freight, transit trade	2,880	3,800	3,650	3,600	3,100	2,700	2,300	2,100	1,600	1,600	1,500	1,480	1,180
Tourist expenditure	7,420	6,000	7,500	8,500	8,500	6,000	2,500	3,000	2,500	750	850	1,300	1,550
Interest and dividends	3,010	3,000	3,500	5,500	5,100	4,000	600	2,000	2,500	4,000	3,840	3,925	3,500
Total	13,310	12,800	14,650	17,600	16,700	12,700	5,400	7,100	6,600	6,350	6,190	6,705	6,230
DEBIT ITEMS:													
Balance of trade	2,207	304	4,480	10,011	12,973	13,262	10,015	9,000	6,850	6,000	8,340	10,050	6,100
Remittances sent abroad by foreign workers	1,670	2,500	2,200	2,500	2,500	1,800	1,200	800	1,000	750	670	650	250
Government payments	1,610	2,250	2,250	600	919	650	500	250	—	—	—	—	—
Total	5,480	5,054	8,930	13,111	16,392	15,712	11,715	10,050	7,850	6,750	9,010	10,700	6,350
RESULTING BALANCE OF PAYMENTS:													
Favourable	7,830	7,746	5,720	4,489	308	—	—	—	—	—	—	—	—
Unfavourable	—	—	—	—	—	3,012	6,315	2,950	1,250	400	2,820	3,995	120

From L. Rist and P. Schwob, ‘La Balance des Paiements’, *Revue d’économie politique*, vol. LIII, pp. 549, 550, 968–777 (Paris, 1939).

Approximate Numbers of Foreign Tourists visiting France (in thousands)

Country of origin	1929	1930	1931	1932*	1933	1934	1937	1938	1939 (first half)
Great Britain†	881	850	870	522	585	506	—	—	—
U.S.A.	296	275	205	143	101	74	—	—	—
Spain‡	350	250	200	120	95	80	—	—	—
Belgium	38	25	52	41	42	30	—	—	—
Switzerland‡	45	41	46	35	36	33	—	—	—
Netherlands	55	53	51	30	21	33	—	—	—
South America	150	88	50	20	11	10	—	—	—
Germany	35	38	28	10	25	4	—	—	—
Austria	30	23	18	6	5	2	—	—	—
Others	30	23	20	15	10	5	—	—	—
Total	1,911	1,668	1,542	944	931	779	1,250	1,000	650§

* Including many who came to visit the Colonial Exhibition at Paris.
† Including tourists staying only one or several days.
‡ Not including tourists staying only one day.
§ Estimate.

From *Annuaire Statistique, 1938*, p. 130 (Paris, 1939), and other sources.

Transit Trade

France is the medium for a transit trade (i.e. traffic between foreign countries passing through her territory) which is considerable in actual volume though small in relation to her own trade. In 1937, the latest year for which figures are available, 3,660,928 tons of goods entered France in transit to other countries and the same quantity left the country. The great bulk of this tonnage passed over the land frontiers:

Goods in Direct Transit through France, 1937 (*tons*)

	Inward	Outward
By sea	300,736	151,386
By land	3,360,192	3,509,542
Total	3,660,928	3,660,928

The principal commodities making up this trade were as shown on p. 263.

It is clear from the following table that the quantity of goods entering into the French transit trade is liable to considerable fluctuation from year to year. Furthermore, the greatest weight of commodities handled consists of those originating in north-west Europe such as

Classes of Goods in Direct Transit through France, 1936, 1937 (*thousand tons*)

	1936	1937
Mineral ores	372·0	1362·7
Coal	678·3	932·4
Grain and flour	357·5	369·4
Iron and steel	194·3	145·4
Crude oil and petroleum products	170·1	128·2
Fruit (table)	128·9	67·6
Potatoes	45·6	63·7
Phosphatic fertilizers	24·2	56·9
Stone and earth	34·7	42·3
Building materials	36·0	37·3
Metal goods	28·5	25·4
Wine	34·8	24·9
Chemical products	18·8	24·9
Others, including copper and wood-pulp	277·8	347·4
Total	2,433·5	3,660·9

From *Annuaire Statistique, 1938*, p. 153 (Paris, 1939).

ores, coal and steel. Tropical produce, which is usually regarded as the typical commodity handled by entrepôt ports in Europe, like London, Bremen or Copenhagen, is not present in any great quantity. A table of the chief sources and destinations of the transit traffic bears this out more clearly.

Total Quantities of Goods in Transit Trade received from Principal Sources and Dispatched to Principal Destinations, 1937 (*thousands of tons*)

Source	Quantity	Destination	Quantity
Belgium	1,908·3	Belgium	158·0
Netherlands	594·4	Netherlands	23·2
Germany	423·6	Germany	1,484·9
Great Britain	161·9	Great Britain	80·2
Switzerland	86·4	Switzerland	1,672·1
Spain	90·3	Spain	129·8
Italy	42·6	Italy	28·9

From *Tableau Général de la Navigation Maritime, 1937*, p. 57 (Paris, 1938).

A great part of the French transit trade appears to arise from the proximity of Belgian, Luxembourg and German manufacturing centres to each other and to the French frontier, and represents coal and ores moving over comparatively short distances to each other, especially from Luxembourg to Germany. France also occupies a strategic position for transmitting goods from Belgium and the Lower Rhine to Switzerland, although it also imports on Swiss account goods from farther afield. Much of the traffic to Switzerland originates in the need of trans-shipping from large to smaller barges at Strasbourg. Half of the French transit trade with Switzerland consists of coal from the Netherlands, Germany, Great Britain and Belgium.

IMPORT TRADE, 1938

In the following account of the French import trade, the imports are first of all tabulated and classified by value of the principal items. The main groups are then discussed, attention being paid to weight as well as value, and to country of origin. A detailed analysis of the sources of the principal imports will be found in Table 2.

Imports, by Commodities, 1938 (*values in millions of francs*)

Raw materials			25,084·0
Fuels		9,072·5	
Coal, coke, etc.	4,854·4		
Petroleum and petroleum products	4,214·1		
Textile materials		6,133·7	
Wool	2,734·6		
Raw cotton	2,230·9		
Raw silk	361·6		
Flax	307·7		
Jute	263·0		
Phormium, etc.	167·7		
Hemp	68·2		
Oilseeds, etc.		2,934·3	
Oilseeds and oil-bearing plants	2,403·9		
Olive oil	247·4		
Other vegetable oils	266·1		
Fats and greases including margarine	16·9		
Metals and ores		2,258·6	
Copper	913·1		
Tin	300·9		
Lead	149·0		
Zinc	97·2		
Iron and steel	167·9		
Ores	630·5		
Chemical raw materials		762·3	
Stone and earth (largely natural phosphates)	389·5		
Sulphur (including pyrites)	286·1		
Sodium nitrate	86·7		
Other raw materials		3,922·6	
Hides and skins	865·2		
Timber	780·3		
Wood pulp	688·0		
Rubber	690·1		
Tobacco (leaf)	254·8		
Precious stones and pearls	644·2		

Foodstuffs, etc.			11,221·3
Wine, etc.		3,612·4	
Wines	3,300·1		
Eaux-de-vie and spirits	312·3		
Foodstuffs		7,608·9	
Cereals	1,960·3		
Rice	810·1		
Fruit	1,548·3		
Coffee	1,040·3		
Cacao	184·9		
Raw sugar from French colonies	531·6		
Raw sugar from foreign countries	139·2		
Refined sugar	31·8		
Dried vegetables	247·2		
Potatoes	173·8		
Meat	245·3		
Fish	224·2		
Butter and cheese	204·4		
Eggs	94·8		
Animals	172·7		
Manufactures			5,294·2
Metal manufactures		2,769·0	
Prime movers, pumps and compressors	1,550·9		
Machine parts	468·1		
Metal goods	553·5		
Motor vehicles	196·5		
Textiles		358·3	
Woollen	119·1		
Silk and rayon	90·0		
Jute and phormium	77·9		
Cotton	71·3		
Other important items of manufactures		2,166·9	
Chemical products	1,003·6		
Paper, etc.	342·1		
Prepared skins and furs	250·7		
Glass, pottery and crystal ware	237·6		
Rubber manufactures	118·5		
Ships	115·8		
Tobacco	98·6		
Other commodities, not detailed in the above items			4,464·7
Total imports			46,064·2

From *Tableau Général du Commerce Extérieur, 1938*, p. 47 (Paris, 1939).

Imports of Raw Materials: Coal, etc.

In 1938 the total weight of imports amounted to 47,179,772 tons. Nearly 39 million tons comprised fuels and raw materials, and the fuels provided the greater part of this weight—21,849,600 tons of coal and coal products and 7,533,500 tons of petroleum and petroleum products. France is the largest importer of coal in the world. Nearly two-thirds of the coal import are provided by two countries—Great Britain and Germany; Belgium follows fairly closely, while Holland and Poland are important suppliers. Great Britain leads in the supply of steam and domestic coal, and supplies the bulk of imported gas coal; it closely follows Belgium for anthracite, but contributes nothing to the import of coke. Germany supplies nearly half of the coke import, and large tonnages of other kinds. The import of coking coal is in the hands of Germany and Belgium. Belgium is an important supplier in all categories. Holland is the second largest supplier of coke and contributes an important quantity of domestic and coking coal. Poland supplies only domestic coal. Minor suppliers are Indo-China, U.S.S.R. and Morocco (all anthracite), Czechoslovakia (coke) and Turkey.

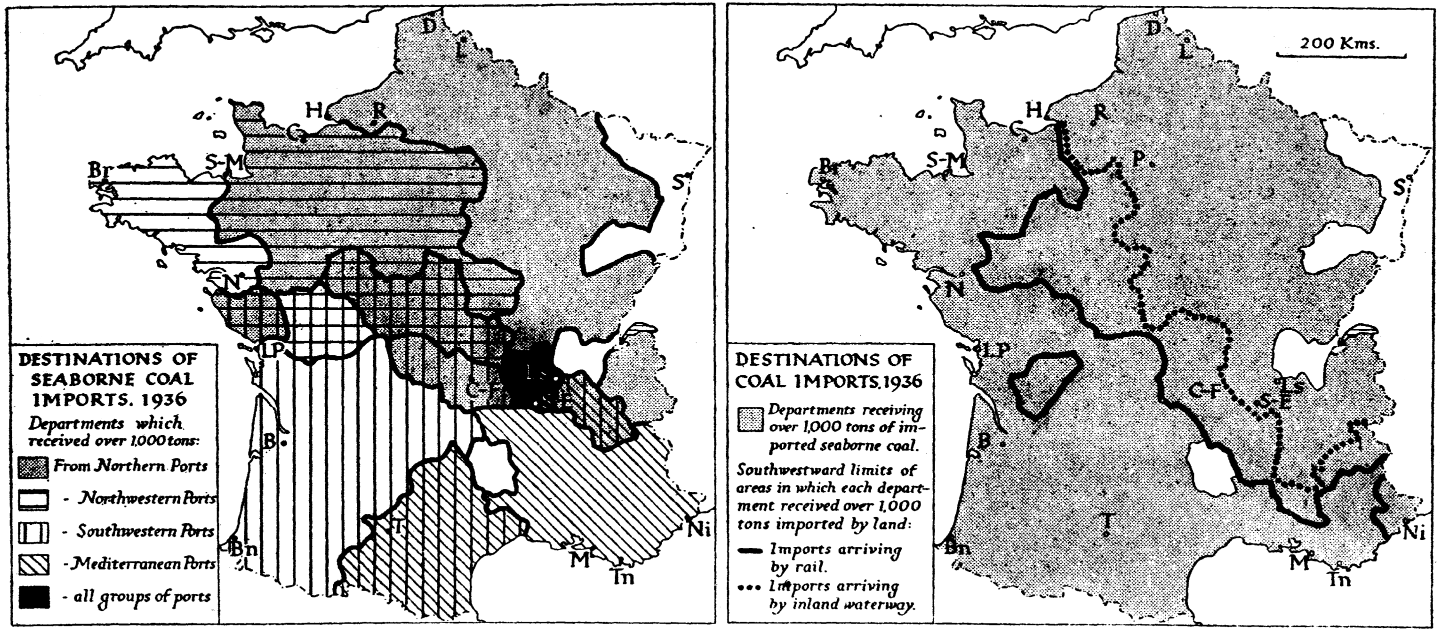
In the past few years the proportions supplied by these countries have changed considerably. Great Britain, which supplied over half of the import up to 1930, supplied less than one-third in 1938; Belgium, Holland and Germany all increased their share of the market, although Poland advanced most.

Percentage of French Coal Imports

Supplier	Average 1928–30	1931	1932	1933	1936	1937	1938
Great Britain	53·5	46·7	51·2	49·5	32·0	30·3	29·5
Germany	22·4	20·0	22·8	22·4	36·4	33·5	30·2
Belgium	15·7	19·2	15·5	16·5	17·0	18·8	21·5
Netherlands	5·1	8·8	5·5	6·4	7·7	10·6	8·9
Poland	2·7	4·2	3·5	4·0	5·0	5·3	7·2
Total	99·4	98·9	98·5	98·8	98·1	98·5	97·3

Detailed figures are available for the year 1937 which show how the coal import entered France. Coke entered entirely by land, as it is impracticable to carry it by sea. Taking the import of solid fuels as a whole, entries by sea almost exactly equalled entries by land. Of the 14 million tons of sea-borne coal 5·5 were carried in French ships, 4·9 in ships belonging to the countries exporting the coal, and 3·6 by ships of other flags. One-quarter of the German export entered France by sea, carried mostly in French ships; of the British export well over half was carried in British ships, and most of the rest in French ships. The Belgian export moved almost entirely by land, the Polish export almost entirely by sea, and the Netherlands export by land and by sea in equal quantities.

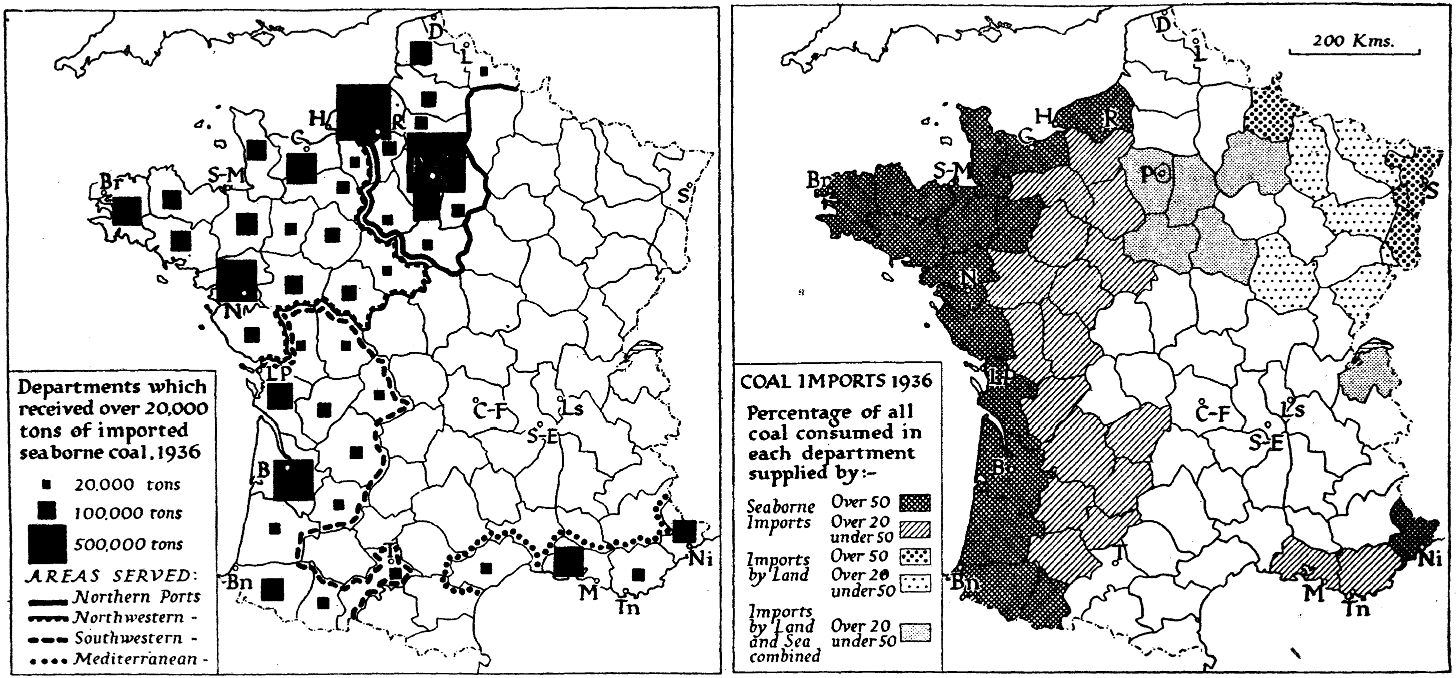
Distribution of Coal Imports within France. The markets or 'hinterlands' of coal from different sources overlap a great deal. Sea-borne imports are distributed to almost every department in the country, but the market for coal which enters by rail across the land frontiers


DESTINATIONS OF SEABORNE COAL IMPORTS. 1936
Departments which received over 1,000 tons:
From Northern Ports
- Northwestern Ports
- Southwestern Ports
- Mediterranean Ports
- all groups of ports
DESTINATIONS OF COAL IMPORTS. 1936
Departments receiving over 1,000 tons of imported seaborne coal.
Southwestward limits of areas in which each department received over 1,000 tons imported by land:
Imports arriving by rail.
Imports arriving by inland waterway.
200 Kms.
D
L
H
R
C
S-M
Br
N
LP
B
Bn
T
C-F
Ls
S-E
S
M
Tn
Ni
P

Figs. 88, 89. The distribution of imported coal within France, 1936 (not including coke)

From *Statistique de l'Industrie Minérale*, pp. 26–9 (Ministère des Travaux Publics, Paris, 1938).

It should be noted that these two figures and Figs. 90–3 show how imported coal was consumed, by departments, after it has entered France by the means of transport named; they do not show how the coal moved in France after it had passed the frontier. In Fig. 88 the northern ports include those from Dunkirk to Rouen; the greater part of the coal import of this group passes through Rouen. The north-western ports include those from Honfleur to Les Sables d'Olonne; the south-western ports include those from La Pallice to Bayonne. B, Bordeaux; Bn, Bayonne; Br, Brest; C. Caen; C-F, Clermont-Ferrand; D, Dunkirk; H, Havre; L, Lille; LP, La Pallice; Ls, Lyons; M, Marseilles; N, Nantes; Ni, Nice; P, Paris; R, Rouen; S, Strasbourg; S-E, St Etienne; S-M, St Malo; T, Toulouse; Tn, Toulon.



Figs. 90, 91. The consumption of imported coal within France, 1936

From *Statistique de l'Industrie Minérale*, pp. 26–9 (Ministère des Travaux Publics, Paris, 1938).

Fig. 90 shows the departments which consumed large quantities of seaborne coal. Fig. 91 shows the degree to which imported coal, whether entering by sea or by land, competed with home-produced coal. It will be noted that in spite of its enormous consumption of imported coal, the Paris region consumed more French coal than foreign; a similar position existed in the neighbourhood of Marseilles and Toulon.

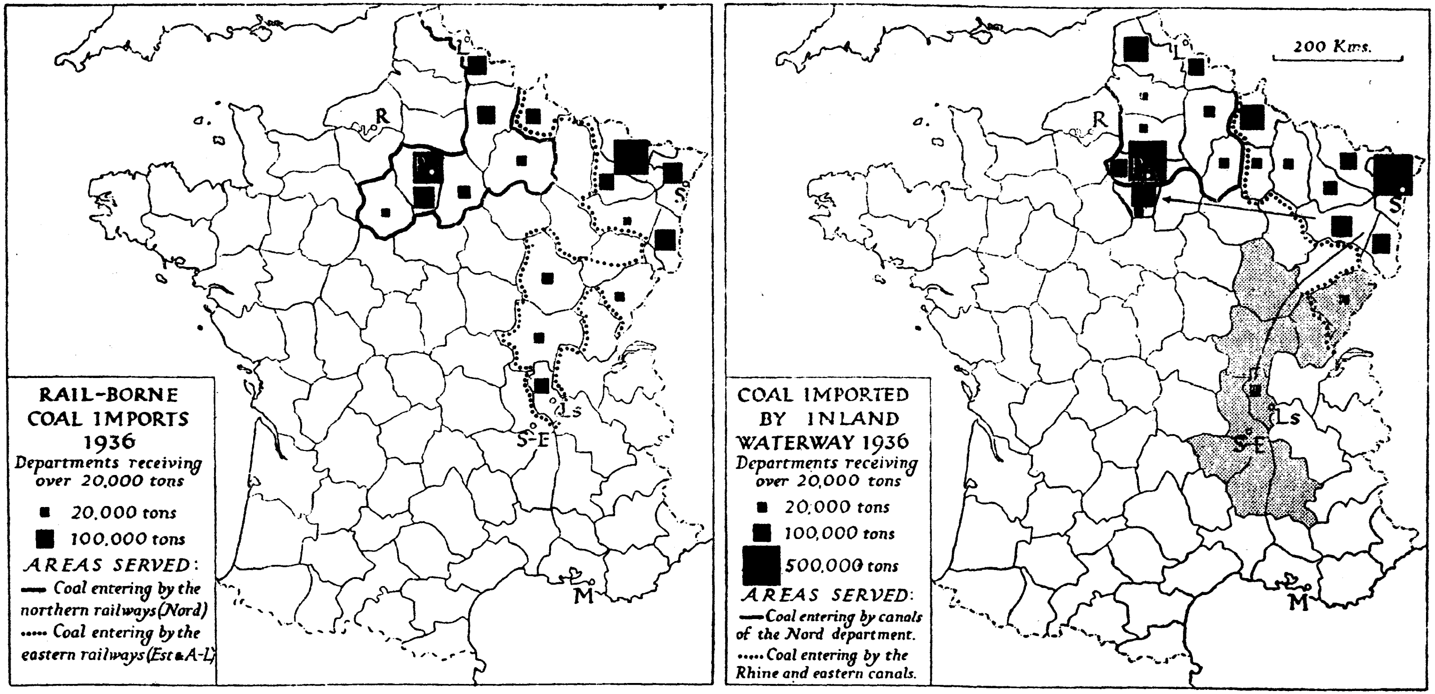
is more restricted, extending only to the south-west as far as a line joining the Seine estuary with the lower Rhône. Coal entering by inland waterway has a similar though more restricted hinterland. The dominant effect of the cheapness of sea freights can be seen in the fact that coal entering by sea at Rouen reaches the Jura and the Alps. The two departments of Loire and Rhône, in the heart of the country, receive over 30,000 tons of sea-borne imports from all three coasts, in spite of the proximity of the coalfield near St Etienne. These two departments are also served by coal entering France both by rail and by inland waterway. The whole of the Saône valley above Lyons and the Rhône valley below the city form a market where all suppliers of coal compete with each other. Port interests at Strasbourg aim at capturing this area entirely for Ruhr coal entering by way of the Rhine, to the exclusion of coal entering by sea. (See Figs. 88–93.)

The Paris region is an area like the Lyons region in that all suppliers of imported coal compete there, although the quantity concerned is very much greater. Here, however, imports entering France by sea, by rail and by inland waterway are likely to remain in competition, without any one being able to exclude either of the others. The consumption of coal in these two areas may be analysed as follows:

Origin of Coal consumed in the Lyons and Paris Regions, 1936 (*thousand tons*)

Origin of coal consumed	Total, Lyons region (departments of Loire and Rhône)	Total, Paris region (departments of Seine, Seine-et-Oise, Seine-et-Marne)
Imports:		
Sea-borne	31	1,556·5
Rail-borne	82·5	552
Inland waterway	60·5	857
	174	2,965·5
Coal mined in France	1,871·5	5,784·5
Total consumption	2,045·5	8,750

Competition between French and foreign coal shows very clearly the dominant influence of transport costs. In sixteen departments on or near the coast sea-borne imports exceed sales of home-produced coal. In only three departments imports entering by land exceed the sales of home-produced coal—Ardennes, near the Belgian coalfield, and Haut-Rhin and Bas Rhin, which lie along the Rhine (see Fig. 91).


RAIL-BORNE COAL IMPORTS 1936
Departments receiving over 20,000 tons
20,000 tons
100,000 tons
AREAS SERVED:
Coal entering by the northern railways (Nord)
Coal entering by the eastern railways (Est & A-L)
COAL IMPORTED BY INLAND WATERWAY 1936
Departments receiving over 20,000 tons
20,000 tons
100,000 tons
500,000 tons
AREAS SERVED:
Coal entering by canals of the Nord department.
Coal entering by the Rhine and eastern canals.
200 Kms.
L
R
P
S
Ls
S-E
M

Figs. 92, 93. The principal departments which consumed imported coal entering France by rail and by inland waterway, 1936

From *Statistique de l'Industrie Minérale*, pp. 26–9 (Ministère des Travaux Publics, Paris, 1938).

In Fig. 93 the stippled area represents those departments from which the port interests of Strasbourg wish to exclude coal entering France by sea, in favour of Ruhr coal entering by the Rhine. At present all these departments receive small quantities of imported sea-borne coal (see Figs. 88, 89).

Imports of Raw Materials: Petroleum and Petroleum Products

Petroleum and refined products make up the second heaviest import. The great bulk is in the form of petroleum, of which 6,981,200 tons were imported. Nearly 80 % is derived from two suppliers: Iraq, which provides 46 %, and U.S.A., 33 %; most of the rest is supplied by the South American countries: Venezuela (9 %), Colombia (6 %) and Peru (0·5 %), while Romania provides 0·5 %. Imports of gasoline have dropped to a relatively low figure, and in 1938 reached only about 550,000 tons. Over half of this import was supplied by U.S.A. and most of the remainder by Romania. The heavy oil derivatives ('gas', 'road' and 'fuel' oils) totalled nearly 600,000 tons. They came from a variety of sources; one-quarter of the total was supplied by Colombia and Perú, while important contributions were made by U.S.A., Iran, U.S.S.R., and smaller quantities were supplied by Venezuela, Romania and Mexico. (See table, p. 352.)

The recent establishment of a refining industry in France, as a deliberate state policy, has resulted in a considerable change in the relation between imports of crude oil and gasoline in recent years:

Imports of Crude Oil, Gasoline, etc., 1925–38 (*tons*)

	Crude oil	Gasoline	Other products	Total
1925	2,550	1,036,900	936,732	1,976,182
1928	14,060	1,424,964	1,184,552	2,623,576
1931	518,559	2,150,282	1,368,044	4,036,885
1934	4,321,869	1,039,731	783,629	6,145,229
1937	6,151,728	614,816	998,527	7,765,071
1938	6,981,199	552,270*	586,600	8,120,069

* Approximately.

In 1924 a national company (*Compagnie Française des Pétroles*) was formed in France to take part in the working of the Iraq oilfield and building of a pipe line, through the Iraq Petroleum Company, in participation with the Royal-Dutch-Shell group, the Standard Oil Company of New Jersey and the Anglo-Iranian (Persian) Oil Company, 95 % of the company's capital being held by these four interests in equal shares. The *Compagnie Française des Pétroles* had a capital of 600 million francs, held in large part by the French government. Besides its part in developing the Iraq oilfield the company also holds 55 % of the capital of the *Compagnie Française de Raffinage* (see p. 229).

Office National des Combustibles liquides. The government maintains a special department to deal with matters concerning petroleum and petroleum products—the *Office National des Combustibles liquides.* Until 1936 the department worked under the Ministry of Commerce, but in that year it was transferred to the Ministry of Public Works; in 1939 it underwent a thorough reorganization.

Distribution of Petroleum Products within France. The form of transport employed in bringing gasoline, kerosine, etc. to the consumer varies according to local circumstances, but it is worth noting that, as well as road and rail, inland waterways and coastal shipping play an important part. The department of the Cher, for example, almost in the centre of the country, is served in part by tank barges on the Loire Lateral Canal. In a country as large as France the cost of distribution away from the large ports increases appreciably, and the price of gasoline varies accordingly. At Clermont-Ferrand and in the Alps the wholesale price ranges about 18% above the price at Rouen and Paris, and 12% above the price at St Nazaire, Bordeaux or the Mediterranean coast. The facilities for the import of crude petroleum and gasoline at Strasbourg permit Alsace to enjoy a moderate price. Besides the whole of the interior, the north-west of Brittany and the Pyrenees region are 'high-price' areas, owing to their relative remoteness from large distributing centres (see Fig. 94).

Petroleum products in France are subject to very considerable taxation, the incidence of which is heavier than in any other European country:

C.i.f. prices and taxes and duties in relation to gasoline prices in various countries,* 1935

	Percentage of filling station price absorbed by	
	Taxes and duties	C.i.f. price
Paris	73·4	11·3
Rome	71·0	8·3
Brussels	65·5	19·6
Berlin	56·6	10·9
Amsterdam	52·4	16·9
London	44·4	19·1
Oslo	38·5	25·3

* C.i.f., 'cost, insurance, freight', i.e. the cost as imported.

From T. Koopmans, *Tanker Freight Rates and Tankship Building*, p. 34 (London, 1939).

Imports of Raw Materials: Textile Materials

The greater part of the *wool* import is supplied by four countries—Australia, New Zealand, South Africa and the Argentine; Great

Britain and Morocco are minor sources of wool. In the import of *raw cotton* the U.S.A. provides over half the total and the amount supplied by Egypt exceeds that from India. The relatively small import of Indian cotton reflects the high quality of French textiles. Smaller quantities are imported from Brazil and from the French colonies in West and Equatorial Africa. The remaining textile raw material imports are much smaller in quantity and consist of *silk*, mainly from China, *jute* from India, *phormium* and *hemp*.

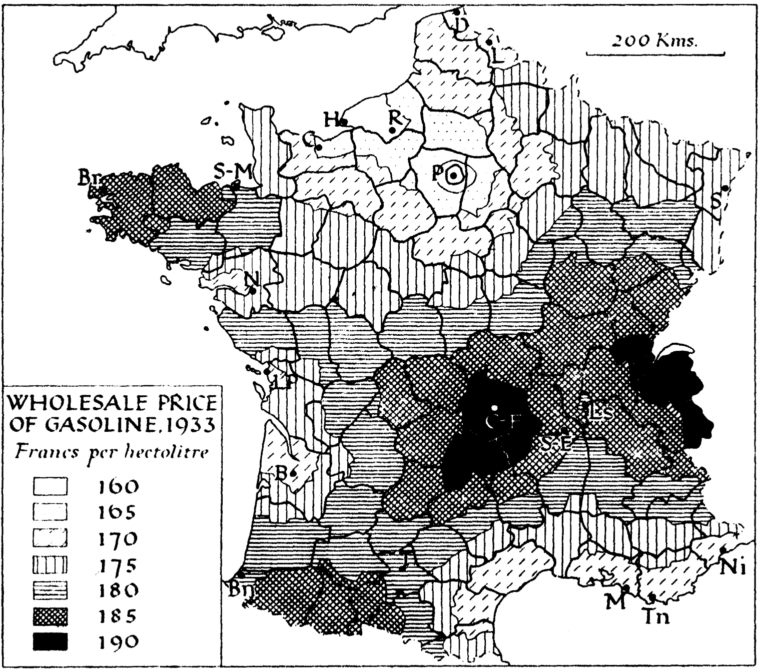


Fig. 94. Variations in the wholesale price of gasoline, 1933

From *La Revue Pétrolifère*, p. 1149, No. 550 (Paris, 1933).

The map demonstrates the effect of transport costs in raising the price of gasoline; the low prices areas are all near the importing and refining centres (see Fig. 82 for the location of petroleum refineries).

Imports of Raw Materials: Oilseeds and Vegetable Oils

A great weight of French imports consists of oil-bearing seeds and vegetable oils—1,350,000 tons of seed and 78,000 tons of oils (1938). Over half of this weight was provided by the *ground-nut* import of 847,000 tons. Of this, over half a million tons were derived from French West Africa, and over 200,000 from India, with the remainder coming from other African territories. *Linseed* accounted for 200,000 tons, and is derived mainly from Argentina. *Copra*, amounting to just over 140,000 tons, is supplied from a variety of sources: the principal source is the Philippines, but French Oceania, Malaya and the Netherlands East Indies, Indo-China and Tropical Africa all contribute important shares. *Palmetto kernels* provide the remaining bulky import, while there is a small weight of various seeds derived from a great variety of sources; hardly any cottonseed or cottonseed oil was imported.

The vegetable oils imported are of two kinds, oils which have been refined or partly treated, such as those employed in the manufacture of soap, and the oils imported directly from the countries producing the seeds. The principal item is *olive oil*, amounting to nearly half the total, and derived in equal quantities from Algeria and Tunisia. Partly refined oils include *coconut oil* and *ground-nut oil* from Holland, and *soya-bean oil* from Holland and Sweden. Unrefined *coconut oil* and *palm oil* are derived from the West African colonies, and a very small quantity of '*wood-oil*' from China, Hong-Kong and Indo-China.

Imports of Raw Material: Metals and Ores

In 1938 the weight of ores and metals imported was approximately 1,400,000 tons. Nearly one-third of this total was represented by *iron ores* which amounted to 437,000 tons (920,000 tons in 1937). These ores are of special types, such as haematite, and supplement the great home production. Of this ore import Belgium, Algeria and Sweden each supplied one-quarter, while most of the remainder came from Tunisia. Imports of *pig-iron* amounted only to 30,000 tons, and *iron and steel* imports were also only 30,000 tons, largely from Belgium. Imports of *tool steel* were naturally small in weight; they were supplied mainly by Sweden, Austria and Czechoslovakia. The import of iron and steel scrap is very small.

Of the metals used in steel making *manganese* accounted for the largest quantity—321,000 tons. India and U.S.S.R. each contributed about one-third, while Morocco, Brazil and South Africa supplied most of the remainder. Of the *chrome* import, Turkey and southern Africa supplied the greater part, although a small quantity came from New Caledonia. *Nickel* was imported in various forms; of the total weight nearly half was concentrates from New Caledonia; of the refined nickel the greater part came from Belgium, with Great Britain, Norway and Canada and Switzerland supplying the remainder.

Of the other metals which enter into commerce on any scale, *zinc* provided the largest import, with 228,000 tons. Three-quarters came into the country as zinc ore, from many sources: Mexico supplied the largest amount, then followed North America, Turkey, Australia, Yugoslavia, Sweden, and Italy; of the metallic zinc, Belgium supplied most, followed by Norway, Indo-China, Mexico, Holland and Canada. *Copper* in various forms, including scrap, amounted to 123,000 tons: the greater part was supplied by Chile, Belgium and U.S.A., with Great Britain, Canada and Norway providing smaller amounts. *Lead* in various forms was imported to the amount of 100,000 tons: Belgium, Morocco, Yugoslavia and Tunisia were the principal sources, but there were many minor suppliers. The 10,000 tons of *tin* imported was mostly metallic tin; one-third came directly from Malaya, and apart from small quantities supplied by Indo-China and the Netherlands East Indies, the remainder was supplied by Holland, Belgium and Great Britain.

Imports of Raw Materials: Non-metallic Minerals

Among the raw materials imported are a variety of stone and earth entering into the chemical and other industries. Great Britain supplied the great bulk of the *kaolin* import, and Germany the coarser clays; in all the remaining materials of this type, such as *natural dolomite*, *glass-sands*, *refractory earth*, etc., and in *lime*, *cement* and *stone*, Belgium was the leading supplier. India and South Africa together supplied most of the *mica*, though there was a small import from Madagascar. Canada supplied most of the *asbestos*, and South Africa and Northern and Southern Rhodesia most of the remainder, though a small quantity was obtained from U.S.S.R.

Natural phosphates, amounting to nearly 1 million tons annually, are the raw material for the manufacture of superphosphates and other phosphatic fertilizers at the principal ports. Well over half the quantity was supplied by Tunisia, and most of the rest by Morocco and Algeria, but smaller quantities were imported from U.S.S.R. and Belgium. *Sulphur* and *pyrites* were each represented by an import of over 400,000 tons. Of crude sulphur more than half was supplied by Portugal and most of the remainder by countries in western Asia. Unrefined sulphur was derived mainly from U.S.A., with a substantial quantity from Italy. Portugal provided the great bulk of the pyrites import, and countries of western Asia a considerable quantity, while Greece, Norway and Belgium provided small quantities.

The various heavy chemicals and related products came from a great variety of sources. The import of *coal-tar pitch* amounted to over 500,000 tons; nearly half was supplied by Great Britain, a large quantity by U.S.S.R., and smaller amounts by Germany, Belgium, Poland and U.S.A. *Ammonium sulphate* for agricultural use was supplied mainly by Belgium and Germany, but imports were also derived from Holland, Poland and Great Britain; *sulphuric acid* was supplied almost entirely by Belgium, and *copper sulphate* by Great Britain and Belgium. Imports of chemical fertilizers consisted of over 100,000 tons of *phosphates*, and over 200,000 tons of *nitrates*. Most of the phosphates were supplied by Belgium and Holland. Of nitrates one-half were natural nitrates from Chile; the synthetic nitrates were imported from U.S.A., Germany and Norway. An enormous variety of fine chemicals, of small bulk and considerable value, was imported from a number of sources, and entered into a vast range of manufactures. Germany was the chief supplier, but Great Britain, U.S.A. and Switzerland contributed considerable proportions of the import.

Imports of Foodstuffs

The import of wine and foodstuffs amounted to about one-quarter of the total import trade by value. The import of wine has reached enormous proportions, 90% being obtained from Algeria (nearly 15 million out of 16 million hectolitres), and nearly one million hectolitres from Tunisia. Imports of other drinks consisted principally of eaux-de-vie (derived from sugar), from the French West Indies and Réunion.

Among foodstuffs the cereals take the leading place. The chief item is *maize*, for animal feedstuffs; the great bulk was supplied by Indo-China, while Madagascar and West Africa supplied most of the rest. The *rice* import closely followed that of maize, and was supplied almost completely by Indo-China. Of the small import of *wheat* more than half was supplied by the three North African colonies, and much the same was true of the trifling imports of oats and barley.

Closely following the cereals came the imports of fruits. *Bananas* were the largest single item: almost the entire quantity was supplied by French West Africa and the French West Indies in equal amounts. Over half the *orange* import came from Spain, with Algeria and Syria providing considerable quantities; other citrus fruits came mainly from Italy, with a small contribution from Syria.

The third largest food import by value was *coffee*. Nearly half was supplied by Brazil, while of the remainder a great part was supplied by Madagascar, followed by the colonies in West and Equatorial Africa. The small import of *cacao* was also derived mainly from the West African colonies. Another colonial product, *cane sugar*, followed coffee in importance; in 1938 over 300,000 tons were imported, well over half from the colonies of Réunion and the French West Indies; the remainder was supplied by Cuba, the Dominican Republic and the Netherlands East Indies.

The remaining items of food imports comprised a great variety. Dried vegetables such as *haricots* and *lentils* were supplied mainly by North Africa. *Early potatoes* amounted to over 60,000 tons, and were obtained almost entirely from Algeria; *other potatoes* amounted to over 90,000 tons, of which two-thirds were supplied by the Netherlands. The meat import was comparatively small; the greater part was *frozen beef*, supplied mainly by Madagascar; *mutton* imports were only about one-third of the beef imports, and were provided largely by Algeria and Morocco. In spite of her great fishing industry, France imported 46,000 tons of fish in 1938. One-third of these were *sardines*, the bulk being supplied by Portugal and Morocco in roughly equal proportions and the remainder by Algeria. The small amount of other tinned fish was supplied mainly by Canada, Japan and U.S.A. The import of other sea fish, fresh, salted, dried or iced, amounted to 22,000 tons: Great Britain provided more than one-quarter, and Norway, the Netherlands, Belgium, and all the North African colonies had a share in the trade.

Butter, *cheese and eggs* provided a comparatively small part of French foodstuff imports, and were supplied largely by Denmark.

Imports of Manufactures

Of all the imported manufactures nearly one-half by value were accounted for by machinery and metal goods. In the import trade in machinery of various kinds, Germany was the most important supplier, with a clear lead over all competitors in such classes as metal-working machinery, heavy electrical equipment, internal combustion engines and steam engines, pumps, etc. Germany also closely followed U.S.A. in the supply of agricultural tractors. The U.S.A. were represented in most categories. Great Britain led in the import of steam boilers, but took a secondary place in most groups. Switzerland had an important share in steam and motor engines and electrical equipment, and even supplied 1,000 tons of tractors. Belgium contributed to most machinery imports.

The second most important group of manufactures was the chemicals, described above under raw materials. The remaining categories were each of modest value compared with machinery and metal goods, and chemicals. Textiles showed a very great variety from yarns and cloth to made-up goods, in all the principal fabrics, and were drawn from many countries in Europe as well as Japan.

EXPORT TRADE, 1938

In the following account of the French export trade, the exports are first of all tabulated and classified by value of the principal items. The main groups are then discussed, attention being paid to weight as well as value, and to destination.

Exports by Commodities, 1938 (*values in millions of francs*)

Manufactures			14,153·8
Textile manufactures		4,263·5	
Cotton tissues	1,433·4		
Silk and rayon tissues	978·7		
Woollen yarns	473·3		
Woollen tissues	355·7		
Cotton yarns (not including yarn waste)	311·2		
Clothing and lingerie	243·7		
Silk and rayon yarns	230·4		
Linen, hemp and ramie yarns	129·7		
Jute tissues	107·4		
Metal manufactures		3,416·0	
Machinery and machine parts	1,371·6		
Tools and metal goods	1,147·6		
Motor cars, etc.	896·8		
Other manufactures		6,474·3	
Chemical products	1,625·1		
Paper, etc.	856·9		
Medicinal products	425·3		
Arms, explosives and munitions	410·2		
Perfumes and soaps	389·5		
Prepared skins	331·6		
Pottery, glass and crystal ware	327·2		
Manufactures of rubber	296·6		
Furniture and wooden articles	271·0		
Manufactures in hide or leather	223·9		
Fancy turnery, toys, brushes, fans, buttons, umbrellas	201·9		
Volatile oils and vegetable essences	190·8		
Colouring matters	189·4		
Coachwork	181·5		
Colours, inks, crayons	166·5		
Furs	146·7		
Jewellery, gold- and silversmith's work, gold and silver plate, imitation plate	109·4		
Clocks and watches	63·4		
Millinery and artificial flowers	39·0		
Musical instruments	28·4		

Raw materials		8,230·9
Iron and steel (not including ore and slag)	2,279·8	
Iron ore	908·7	
Copper, including copper ore	204·5	
Precious stones	509·3	
Coal, etc.	277·1	
Building materials	176·4	
Wool (in bulk, combed, dyed or wool waste)	1,498·6	
Cotton, wool and cotton waste	102·9	
Flax and hemp	159·4	
Silk	49·4	
Rags	183·0	
Skins and furs, unprepared	737·2	
Feathers for wear and for mattresses, etc.	53·6	
Common timber	316·9	
Refined vegetable oils, other than olive	258·8	
Real pearls	132·0	
Resins, etc.	117·2	
Oil cake and malt	88·8	
Seed grain	79·1	
Medicinal materials	35·9	
Horses, mules, etc.	33·9	
Fodder and bran	28·4	
Foodstuffs		3,557·1
Wines	865·9	
Eaux-de-vie, spirits, liqueurs	596·9	
Refined sugar, etc.	485·0	
Fruit for eating	440·8	
Cereals, including malt	225·8	
Butter and cheese	201·3	
Fish (fresh, dried, salted, or preserved)	166·0	
Vegetables (fresh, salted or preserved)	164·9	
Potatoes, dried vegetables and vegetable flour	148·8	
Sugar preparations (syrups, confectionery, etc.)	148·3	
Animal fats other than fish oils	62·4	
Rice	34·3	
Animals	16·7	
Parcel post packages		1,745·1
Other commodities, not detailed in the above items		2,898·2
Total exports		30,585·1

From *Tableau Général du Commerce Extérieur, 1938*, p. 49 (Paris, 1939).

Exports of Manufactures: Textile Goods

The exports of all textiles together make up the largest single group by value. Over one-quarter of this value is supplied by yarns, exported in small quantities to most textile-manufacturing countries. *Linen yarns* are supplied chiefly to Belgium, *jute* and *phormium* to Algeria, and *cotton yarns* to Holland, Belgium and Algeria, although they reach a great number of other customers. *Woollen yarns* represent the most important of the yarns group; the Netherlands and Belgium are the chief customers, but Sweden, Great Britain, Germany and Switzerland take considerable quantities. Yarns of *silk and rayon* are supplied to most of the important textile-manufacturing countries of Europe, chiefly Germany and Switzerland, although only a small quantity reaches Great Britain.

Among the tissues, *cotton goods* represent the greatest value. The larger part is exported to the French colonial possessions, while *lace goods* are taken mainly by Great Britain and U.S.A. *Woollen tissues* have a very wide market: the chief customers include Great Britain, Switzerland, Belgium, Argentina and U.S.A. as well as the French Colonies. *Silk tissues* are supplied to many countries; Great Britain is the chief buyer, followed closely by U.S.A., while the third most important customer is Argentina. In the combined group of silk and rayon piece goods *rayon* now provides a much greater weight than silk; its market is world wide, but the great bulk is purchased by ten countries—Great Britain, the Netherlands, Indo-China, Algeria, Australia, Belgium, U.S.A., Tunisia, South Africa and Canada, in order of importance.

Exports of Manufactures: Machinery and Metal Goods (see also Table 3)

Manufactures in metal as a single group comprise one of the largest exports by value. These products are mostly highly fabricated articles, and their sale depends a good deal upon special orders. In the group comprising *steam and motor engines*, *pumps*, *compressors*, the colonies were the most important, but other considerable purchasers were Italy, Belgium, the Netherlands, Switzerland, and Argentina. *Locomotives* were supplied mainly to African colonial territories, although several were bought by Belgium. An important export consisted of *textile machinery*, of which the following countries were the most important buyers (in order of weight of purchases): Belgium, Brazil, Turkey, Great Britain, Egypt, Bulgaria, Poland, Switzerland, Germany, Syria, Indo-China, Argentina, Eire, Portugal. *Agricultural machinery and machine parts* had a very wide market, covering Great Britain, Sweden, Belgium, Italy, Netherlands, as well as the colonial territories. *Heavy electrical equipment* was supplied to Italy, the Netherlands, Belgium, and Poland in important quantities as well as to the colonies. An outstanding group in the machinery class was *metal-working machines*: the largest buyer was Great Britain, which took one-third of the total weight, and the second and third largest customers were U.S.S.R. and Belgium.

In metal goods, two classes depend largely on individual contracts —*cast iron articles* and *iron and steel construction work*. In the former, Venezuela, Egypt, Argentina, the Netherlands, Algeria, Tunisia and

Brazil were the largest purchasers; in the latter class South Africa purchased nearly one-half of the total, being exceeded only by the colonies as a whole. *Iron and steel tubes* made up a considerable export: the French colonies, South America, the Netherlands Indies, the Netherlands, Romania, U.S.S.R. and Switzerland were the more important purchasers. *Motor vehicles* formed a valuable export trade. One-half of the export was purchased by the colonies and the remainder by many countries in Europe and South America, of which Belgium, Romania, Great Britain, and the Netherlands were outstanding.

Exports of Manufactures: Chemical Products

The chemical products described below are classified in the French trade returns as manufactures, although they are normally regarded as semi-manufactures. The chemical products showed a very great variety: among the more important were the following: *nitric acid* (Netherlands, Sweden and the French colonies); *potassium nitrate* (Spain, Great Britain, Netherlands, Netherlands Indies and the French colonies); *ammonium sulphate* (Algeria and Réunion); *calcium carbide* (the North African colonies and Indo-China); *sulphuric acid* (Switzerland, Belgium); *anhydrous alumina* (Norway and Switzerland); *copper and iron sulphates* (Algeria). Several chemical products provided quite large export tonnages: *potassium chloride* to the extent of 730,000 tons was exported in 1938, mainly to Belgium and the Netherlands. Of 94,000 tons of *common salt* exported, more than half was supplied to Belgium, while Belgium and the Netherlands took the greater part of the export of *caustic soda* and *carbonate of soda*. An interesting export was *glycerine*—of the total weight of 4,500 tons, the bulk was supplied to South Africa. Fine chemicals in enormous variety were supplied to many customers, as far as Japan and U.S.A., but mainly to Great Britain and the neighbouring manufacturing countries and Scandinavia. Aniline products were exported largely to Switzerland. A considerable weight was represented by chemical fertilizers, mainly phosphatic: of 365,000 tons, one-third was supplied to Germany and large quantities to Algeria, Belgium, Switzerland and the Netherlands.

Exports of Manufactures: Miscellaneous

The remaining manufactured exports comprise an enormous variety of articles, many of which are highly fabricated products bearing the stamp of style and skill which distinguishes so many

French manufactures. These articles have a widespread market; they include perfumes and soaps, glass and crystal ware, leather goods, furs, millinery, jewellery and gold- and silversmith's work. Others, however, are less well known, but they provide larger values among the miscellaneous manufactures—such are paper, medicinal products, arms, explosives, prepared skins, oils, and vegetable essences.

Exports of Raw Materials: Iron and Steel (see also Table 3)

Among the exports classed as raw materials, iron and steel took the leading place, with a value equal to half that of all textile manufactures and two-thirds that of all metal manufactures. This export was two and a half times the value of the iron-ore export, which was so much greater in weight. Although often a raw material to the purchaser, all the steel is semi-manufactured. The distribution of the main groups was as follows:

	Thousand tons
Pig-iron	527·7
Iron and steel scrap	444·6
Steel	1,177·3

Heavy as was the export of steel from France, the considerable weight of pig-iron is a reflexion of the fact that French industry is not yet advanced enough to consume all the iron and steel the country is capable of producing. Half of the pig-iron was taken by Germany and most of the rest by Great Britain and Belgium, small quantities being purchased by Switzerland, Sweden, Spain and Argentina.

Of the steel export of 1,177,000 tons, one-third was supplied to three neighbouring countries, Great Britain, Switzerland and Belgium (208,000, 116,000 and 83,000 respectively). The remaining two-thirds were widely sold to most countries in Europe and in the rest of the world; Argentina, with an import of 84,000 tons, was the third largest single consumer. *Bar steel* amounted to nearly half the total weight, and had the widest distribution of all. *Blooms and billets* went almost entirely to Great Britain, *plates* had a very wide distribution, while *iron and steel rails* were purchased mainly by countries outside Europe. Tool steel, special steels and ferro-alloys were purchased by the industrial countries of north-west Europe. (For a detailed statement of the exports of iron, steel, and iron ore see Table 3, p. 361.)

Exports of Raw Materials: Iron Ore

Iron ore took an outstanding place in French exports: as a single item it was sixth most important in value, and in weight it amounted to 15·5 million tons, or over one-half the weight of all exports, easily the greatest weight for any single item. The destinations of this ore were very restricted, for over 9 million tons were supplied to Germany and nearly 6 million to Belgium. Great Britain received 338,000 tons while smaller quantities were taken by Czechoslovakia and the Netherlands. The export in 1938 represented a considerable decline from that of 1937, when 19·3 million tons were exported. In that year, too, the destinations were rather different, for then 11·6 million tons were supplied to Belgium and 7·1 to Germany.

Exports of Raw Materials: Other Minerals, Stone and Earth

Among the remaining mineral exports, *bauxite* accounted for 292,000 tons, of which over one-half was supplied to Great Britain and most of the rest to Germany and Sweden. The export of *copper* reached a high value: one-third, by value, was ore and partly refined mineral: of 15,300 tons, the bulk was received by Belgium and the rest by U.S.A.; metallic copper was exported to many European and colonial countries. *Zinc ore* was exported to the extent of 38,000 tons, almost entirely to Norway; metallic zinc chiefly to Poland, Czechoslovakia, Japan and Switzerland; there was also a small export of *manganese ore* to Great Britain, Belgium and Germany. The zinc, copper and manganese ores exported were clearly re-exports. A variety of stone and earth entered into the French export trade, accounting for a considerable weight but no great value: *chalk*, *glass sands*, *flints*, and *refractory earth*. Among building materials the principal item of export was *cement*, of which the greater part was supplied to the colonies in North and West Africa.

Exports of Raw Materials: Textile Materials

Of the textile raw materials *wool* was by far the greatest in value. Nearly 60,000 tons were exported—in bulk, washed and cleaned, combed, carded, etc. The chief customers were all the leading woollen manufacturing countries—Great Britain, Belgium, Germany, Czechoslovakia, Switzerland and U.S.A. The export of *flax* (100,000 tons) was mainly in the form of unworked material, and the greater part was sent to Belgium for 'retting'. A small quantity of cotton linters and yarn waste was exported to all the neighbouring countries of Europe. *Rags* formed a quite considerable export trade: the 63,000 tons exported in 1938 went largely to Belgium, Germany and U.S.A., with smaller quantities going to Great Britain, Italy and Switzerland.

Exports of Foodstuffs

Among the exports of foodstuffs, *wines, spirits and liqueurs* take a dominant place. The wine export was divided as follows:

	Hectolitres
Gironde wines	317,213
Champagne wines, etc.	107,911
Other wines	501,382
Total	926,506

Belgium alone purchased nearly one-third of this quantity, more than all the French colonies together, principally in the less expensive kinds but by no means entirely. The three other leading foreign customers were Germany, Great Britain and U.S.A.:

	Hectolitres
Belgium	300,634
Germany	82,902
Great Britain	77,806
U.S.A.	33,386
French colonies	235,443

The list of customers for French wines included nearly every country in the world. Of liqueurs and spirits derived from wine, the colonies took the greater part of the export, with Great Britain and U.S.A. as the principal foreign customers.

The export of *refined sugar*, amounting to 170,000 tons, was almost entirely confined to the North African colonies, but the export of *sugar preparations* had a much wider market. *Fruits* of many kinds were exported to a variety of customers: raisins to Germany and Switzerland, eating apples to Germany and Belgium, pears and plums to Great Britain and Belgium. The export of *potatoes* has greatly changed its direction in recent years, for in 1938, of the total weight of 90,000 tons, the greater part was supplied to the North African colonies; few were supplied to neighbouring European countries and none to Great Britain.

DIRECTION OF FOREIGN TRADE, 1938

Analysis by Weight

The latest year for which statistics are available to show the movement across frontiers of French imports and exports by weight is 1937. The position then may be summarized as follows:

	By sea	By land	Total
Imports (million tons)	37·3	24·2	61·5
Exports (million tons)	7·0	27·7	34·7
Total	44·3	51·9	96·2

The lack of balance in trade carried on by sea is what would be expected from an economically advanced country like France, for it results from an import of heavy raw materials and foodstuffs and an export of valuable manufactures of small bulk. The trade carried on across the land frontiers was roughly the same in each direction, for the heavy import of coal was balanced by the export of iron ore. The pronounced disproportion between the weight of imports and exports resulted in the total weight of goods moving by land exceeding the weight of sea-borne trade by nearly 20%.

Analysis by Value

The values of import and export items, however, provide better material for the study of a country's trade, for it is values which enter into the 'balance of trade' and the 'balance of payments'. Weight alone, as an index, has the serious drawback of concentrating attention upon heavy goods. When values are considered due regard can be paid to articles of elaborate workmanship.

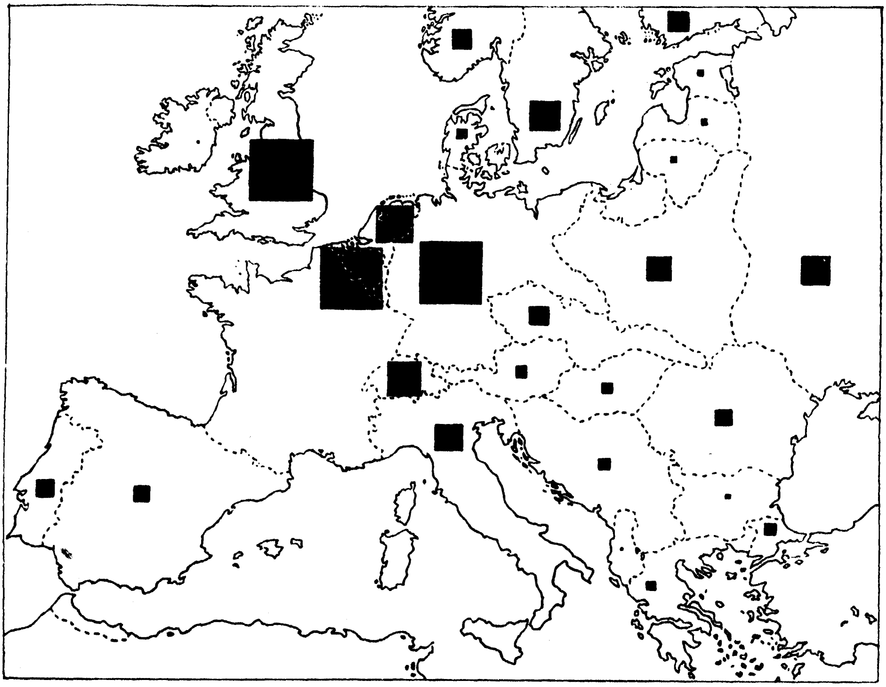


Fig. 95. The sources of French imports from countries in Europe, by value, 1938

From *Tableau Général du Commerce Extérieur, 1938*, pp. 53, 55 (Paris, 1939).

In Figures 95–8 the size of each square is proportionate to the value, in francs, of French imports from, or exports to, each country. The squares in all four figures are constructed on the same scale.

The direction of French foreign trade, on the basis of value, may be described by the following summary which groups the customers of France on a mainly geographical basis (see also Figs. 95–8):

Value of Imports and Exports together, 1938 (*millions of francs*)

Industrial countries of north-western and central Europe (Austria, Belgium, Germany, Great Britain, Czechoslovakia, the Netherlands, Switzerland)	25,622·5	
Scandinavian and Baltic countries, including Poland	3,382·0	
Southern Europe (Italy, Spain, Portugal)	2,135·6	
South-eastern Europe	1,195·1	
Total trade with Europe		32,335·2
French colonial empire	20,889·9	
U.S.A.	6,960·1	
Central and South America	5,066·3	
South-eastern Asia (India, China, Japan, Malaya, Netherlands East Indies, Philippines)	3,496·1	
British Dominions	3,288·0	
Turkey, Egypt, Iran	1,130·0	
U.S.S.R.	798·1	
All other foreign countries	2,697·6	
Total value of imports and exports		76,654·3

From *Tableau Général du Commerce Extérieur, 1938*, p. 51 (Paris, 1939).

Nearly half of the external trade of France is confined to the countries of Europe, and of this proportion by far the greater part is derived from exchanges with the industrialized countries of the north-west. In commercial affairs France is closely bound to these states, and her economic prosperity is greatly affected by their prosperity and commercial policies. It is true that a considerable fraction of this trade consists in the import of coal into France: out of the 25,600 million francs of import and exports of 1938, approximately 5,000 represented the value of French coal imports. A further considerable item arises from the export of iron ore, to the value of about 1,000 million francs in 1938, to Germany and Belgium. The greater part, however, is represented by the type of trade which normally arises between highly developed countries—the exchange of a multitude of manufactures and semi-finished goods, resulting from the advanced division of labour, and from the intense specialization of skill and invention, which are characteristic developments of the economic relations of such countries.

It is not surprising that over one-quarter of all French trade should pass between the metropolitan territory and the colonies. There are many commodities which these territories can supply, and in recent decades great efforts have been made to develop inter-Imperial

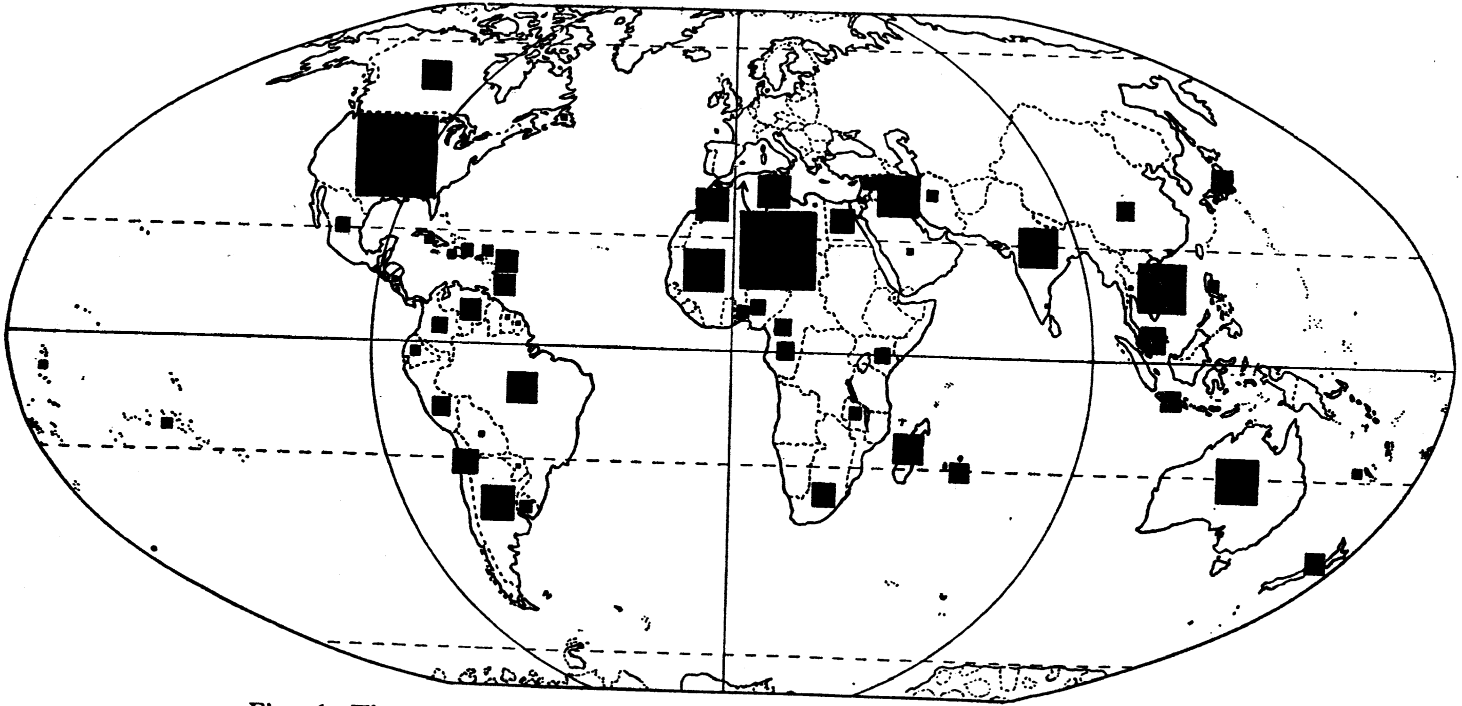


Fig. 96. The sources of French imports from countries outside Europe, by value, 1938 (for the statistics employed see explanation to Fig. 95)

exchanges. Of this colonial trade one-half is accounted for by Algeria and Tunisia, in which territories live considerable populations of French people.

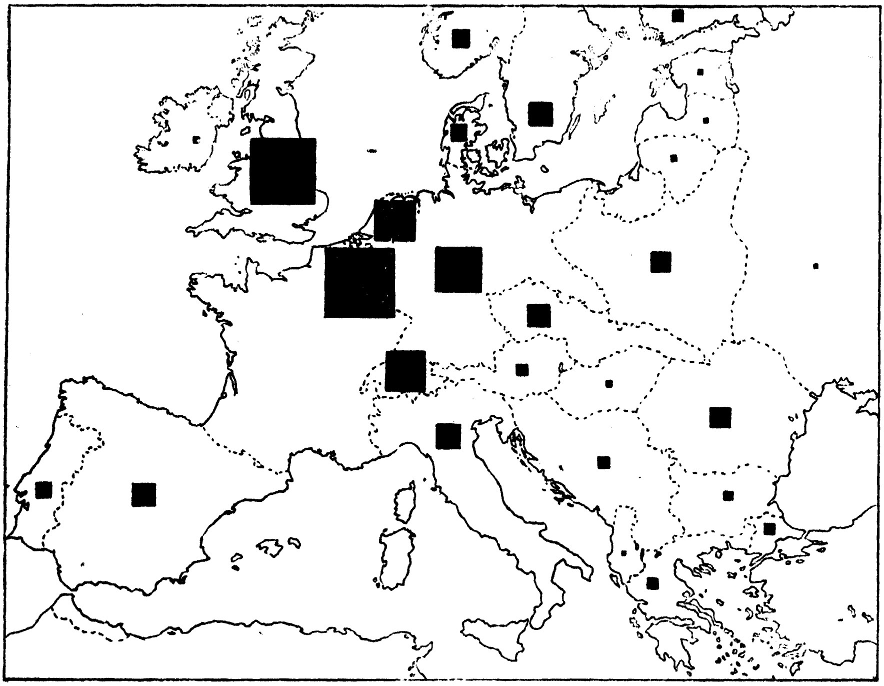


Fig. 97. The destinations of French exports to countries in Europe, by value, 1938 (for statistics employed see explanation to Fig. 95)

Trade with Foreign Countries: Belgium (Table 4)

In 1938 Belgium was the largest importer of French goods, and the fourth largest supplier of French imports. The combined value of the exchanges with Belgium was second only to those with Algeria. Belgium also provided France with a favourable trade balance greater than that achieved with any other country. Coal accounted for one-third of the value of imports from Belgium, and metals in various refined forms for one-sixth—copper, lead, zinc, and nickel, while chemicals represented another important group. Textile raw materials made up a considerable value—these included flax which had been sent from France for retting, and wool and jute yarns. Among the manufactures machinery and metal goods provided the most important group.

Exports from France are extremely varied and no one commodity holds a dominating position. Iron ore led in value but was followed

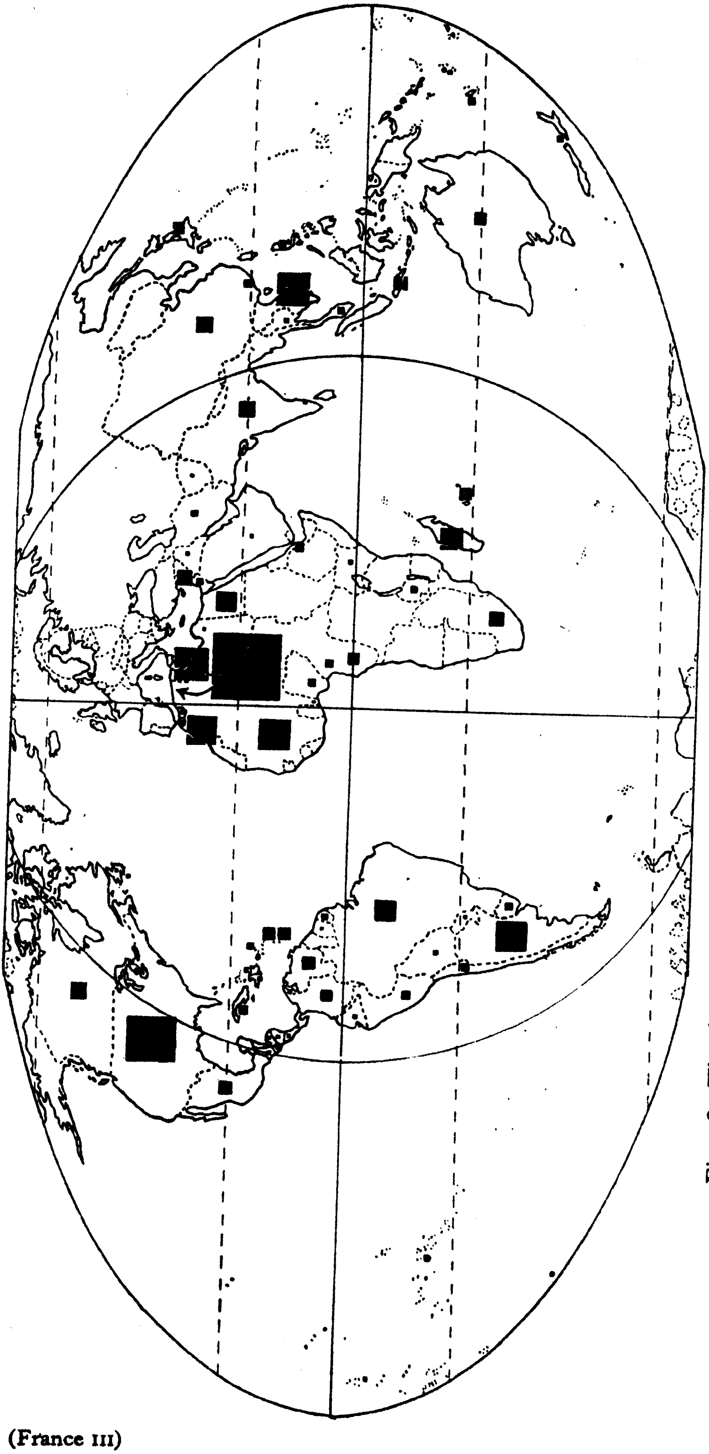


Fig. 98. The destinations of French exports to countries outside Europe, by value, 1938 (for statistics employed see explanation to Fig. 95)

closely by wool, potash, hides and skins, yarns for all textiles, wines, iron and steel, flax, timber, chemicals, all of which were sold in large quantities, while aluminium, pig-iron, copper and ferro-alloys made up a considerable group of metal exports. The manufactures included all the products of French industry, but machinery of many kinds and motor cars were outstanding.

Trade with Foreign Countries: Great Britain (Table 4)

Great Britain and Northern Ireland ranked fourth among the countries trading with France; the value of goods exchanged was approximately equal, with a slight balance in favour of France. Among the imports into France, coal accounted for nearly half the value, and the remaining items were much less important. The metal group—engines, metal manufactures and machinery—was the principal of these, though it was followed by precious stones and natural pearls. An important group of imports consisted of a variety of raw materials—distillates of coal-tar pitch, bitumen and asphalt, copper sulphate and other chemicals, copper and nickel, rags and wool. The remaining items of any importance comprised woollen tissues, ships, manufactures of rubber, and manufactured tobacco. The list of exports from France was long and varied, with no single article in a dominating place. The leading item was silk and rayon tissues, followed by wool, wine and spirits, iron and steel, precious stones, fruit, and unworked skins and furs. Many other articles of secondary importance made up a considerable value: prime movers, wooden manufactures, chemicals, timber, pearls, woollen yarns and tissues, skins, furs, pearls, pig-iron, aluminium, and many more.

Trade with Foreign Countries: Germany (Table 4)

Germany took the fifth place among countries trading with France, the balance being heavily in favour of Germany. The exports to France were those of a greater to a lesser industrial country, for all the leading items were mineral or industrial products—coal, machinery, metals, chemicals, scientific instruments, dyestuffs. French exports were varied; iron ore, though outstanding in weight, was less than twice the value of the second most important export, viz. wool. Pig-iron, together with iron and steel, formed the third group, followed by worked and unworked skins and furs. Silk and woollen yarns and tissues, fruit, wines, dyestuffs, resins, rags, raw cotton and animal greases made up the remaining items of importance. The general character of Franco-German trade is summed up by the fact that the value of all French exports to Germany was less than the value of German exports to France of coal and machinery.

Trade with Foreign Countries: Switzerland and the Netherlands (Table 4)

In its trade with Switzerland, France appears rather as a less-developed country dealing with a highly industrial one: imports were machinery, clocks and watches, dyestuffs and metal manufactures, together with high quality cheese; half the exports consisted of iron and steel, coal, foodstuffs and wine, textile raw materials and semi-manufactures (wool, silk and woollen yarns, raw silk), chemicals, skins, timber and precious stones. The balance of trade was heavily in favour of France.

Trade with the Netherlands reached approximately the same value in each direction. Imports consisted principally of coal, followed by an important group of re-exported products from the Netherlands East Indies—tin, spices, refined vegetable oils, together with precious stones. Other important items were the products of Netherlands agriculture. Among French exports the leading place was taken by semi-manufactured articles—yarns of wool and cotton, iron and steel, and chemicals; next in importance were articles representing most French manufactures.

Trade with Foreign Countries: U.S.A. (Table 4)

Taking imports and exports together, the U.S.A. was the third most important foreign customer of France in 1938. Imports of American produce were approximately three times the value of French exports. The U.S.A. acts both as a source of important raw materials and as a supplier of highly fabricated manufactures. The import of petroleum and its derivatives in 1938 exceeded the value of all French exports to U.S.A. Following closely was raw cotton, for which U.S.A. is the principal source; and the general group of machinery, motor cars and metal manufactures was nearly as important. Raw and semi-manufactured materials, such as copper, chemicals, sulphur, skins and furs, tobacco, timber, and wood pulp, together with a heavy tonnage of fruit, made a considerable contribution to the list of American exports.

French exports illustrate clearly the specialized products which France can supply to a large and prosperous market like that of the U.S.A. Wines, brandy and spirits contributed the largest total, followed by paper, much of which is used in cigarette manufacture, and by silk and rayon tissues. Another typical group is that of refined olive oil, vegetable essences and perfumes, and soap. Important manufactured exports were cotton and woollen tissues, together with hide and leather goods. Raw and semi-manufactured materials were represented by a great value of hides and prepared skins and smaller quantities of tartrates, aluminium, wool, chemicals and iron and steel.

Trade with the Colonial Empire (Table 4)

Imports from the colonies are simply described as foodstuffs and raw materials, although a number of important materials like coal, petroleum and copper are not obtained in any quantity. The import of wine from Algeria bulks large, and represents almost one-quarter of the total value of imports from all the colonies. Cereals, fruit, vegetables, animals, olive oil, wool, tobacco, and fodder all provide important contributions from this productive territory. Tunisia, while also supplying wine, cereals and olive oil, is important for two minerals, phosphates—of which 542,000 tons were imported in 1938—and lead. Morocco provides principally cereals, wool, eggs, fruit, fish and two important minerals—phosphates and iron and manganese ores, of which 127,000 tons and 82,000 tons were imported in 1938. The commodities received from Indo-China are limited in number—rice and maize, each over 500,000 tons, dominate the import trade, while rubber, anthracite, tin and oilseeds provide much smaller tonnages but are likely to become more important in the future. The territories of West and Central Africa form the chief storehouse of tropical products other than sugar; nearly two-thirds of the value of imports into France in 1938 comprised oilseeds, amounting to 600,000 tons. Timber, bananas, coffee, cacao and cotton account for most of the rest. It is a French dream to make of West Africa another Brazil. Imports from Madagascar are dominated by coffee—35,000 tons—and by meat and hides; cereals, tapioca and phormium are the principal remaining items. Imports from the remaining colonies are dominated by one or two commodities—Guadeloupe and Martinique by cane sugar and bananas, Réunion by cane sugar, New Caledonia by chrome ore and nickel, the other French territories in the Pacific by copra.

Exports to the colonial empire comprise almost every French manufacture and semi-manufacture—textiles, especially cotton goods, machinery, motor vehicles, iron and steel, cement, chemicals, refined petroleum products, sugar, and a great variety of other articles. It should be remembered that the colonies provide important outlets for French construction enterprises, in the building of ports, railways, public utilities, etc., although participation is not, in fact, confined solely to French engineering firms.

Colonial supplies now provide a great proportion of many French imports, a proportion which has been increasing in recent years. Nevertheless, for many commodities, France depends upon supplies from the British and Netherlands empires.

Approximate Percentages, by Weight, of certain French Imports supplied by the French empire, 1938

Natural phosphates	91·3	Rubber	24·0
Nickel (concentrates)	97·0	Cotton	3·0
Lead (not ore)	34·8	Phormium	30·0
Tin (not ore)	8·2	Tobacco	5·0
Zinc (not ore)	13·1	Maize	92·0
Ores (chiefly manganese, chrome, iron)	26·4	Rice	96·0
		Coffee	33·0
Oilseeds	53·2	Cacao	55·0
Olive oil	89·0	Sugar	60·0

The trade with the colonial empire may be summarized as follows:

Value of Imports into France and Exports from France (in million francs)

	1937 Imports and Exports together	1938			1938 Balance
		Imports	Exports	Imports and Exports together	
Algeria	7,097·0	4,864·0	3,779·5	8,643·5	−1,065·5
Tunisia	1,540·3	878·5	980·5	1,859·0	+ 102·0
Morocco	1,135·0	857·8	709·9	1,567·7	− 147·9
Indo-China	2,391·0	1,890·6	928·9	2,819·5	− 961·7
French West and Equatorial Africa	2,270·3	1,752·6	852·1	2,604·7	− 900·5
Madagascar	806·6	680·3	387·6	1,067·9	− 292·7
French West Indies	810·3	675·6	266·0	941·6	− 409·6
Other colonies	1,073·9	891·9	504·8	1,378·0	− 387·1
Total	17,124·4	12,491·3	8,409·3	20,881·9	−4,082·0
Total foreign trade	66,329·6	46,064·2	30,590·1	76,654·3	−15,474·1
Percentage of all foreign trade	25·8	—	—	27·2	—

From *Tableau Général du Commerce Extérieure, 1938*, pp. 51, 53, 55 (Paris, 1939).

It can be seen that there is a considerable excess of imports into France over exports to each colony, except in Tunisia; the fact is not surprising for while the colonies produce many commodities which France needs, they cannot offer markets for many of the finished articles which France produces.

Growth of Trade with the Colonial Empire

This colonial trade is, however, different from the rest of the foreign trade of France in that the excess of imports over exports involves no exchange considerations. It is an adverse balance in the sense that the excess has to be paid for in some way or another, but it is not like the adverse balance with a country outside the French currency system. The excess balance is paid for in francs; there is no need for the acquisition of foreign currencies, and thus no strain is imposed on the value of the franc. This situation has been one factor in the attempt in French commercial policy to increase trade with the colonial empire, others being strategic considerations and a desire to extend the development of the colonial territories. A variety of measures, some involving of tariff discrimination, and others less direct in their action, have resulted in the share of the colonies in French trade increasing considerably in the ten years before 1939.

Year	Colonial percentage of total	
	Imports	Exports
1909–13 average	11·1	12·8
1920–24 ,,	9·62	13·89
1925–29 ,,	11·90	16·29
1930	12·44	20·66
1931	14·62	23·53
1932	20·88	31·49
1933	23·67	33·42
1934	25·30	30·89
1935	25·78	31·56
1936	28·55	33·38
1937	24·41	28·36
1938	27·11	27·42

Commercial Policy

A discussion of the commercial policy of a state centres chiefly upon the attitude which it adopts towards trading relations with foreign countries, and the way in which it controls those relations by means of tariffs and other devices. In the following short account all statements on tariff levels and tariff changes are inevitably generalized, for tariff systems are extremely complicated, and as a rule any tariff agreement between two countries represents a lengthy and detailed series of concessions applying to a multitude of articles and quantities. The French tariff has been described as the most complicated in the world. It should be remembered, further, that the actual height of a tariff can sometimes be of lesser importance to other trading nations than its degree of stability over long periods.

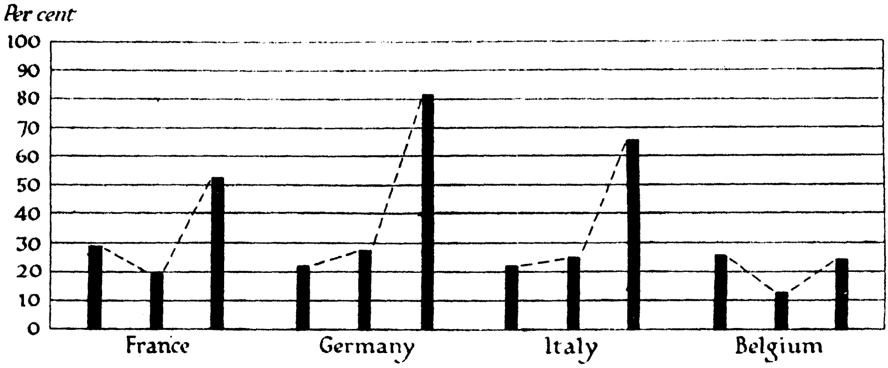
In the later nineteenth century, France, like most European countries, and in contrast to Great Britain, maintained a fairly elaborate system of tariffs on imported goods. It was, however, a liberal tariff policy, bound up with numerous trade agreements which contained the 'most-favoured-nation' clause. By this clause, common to so many commercial treaties, France undertook to extend to the other signatory automatically any tariff reduction or other favour granted to any third country in future—in return, the negotiating power granted a similar concession to France. The clause implied, in fact, equal treatment for all. After the Franco-Prussian War and the depressions of the 'seventies and 'eighties, however, further protection was adopted, and in 1892 tariffs were increased. The position remained practically unchanged until 1914. This moderate tariff level provided the minimum degree of protection necessary to maintain those economic activities deemed essential to national prosperity. The tariff of 1892 had established two rates of duty: the general and the minimum. The general rate was applied to a country with which France had no commercial agreement, but when a commercial treaty was concluded the minimum rates, wholly or in part, were granted; many such treaties were concluded, and there was, further, a wide application of the most-favoured-nation clause. By 1913, sixty-two conventions had been concluded, of which thirty-five contained the most-favoured-nation clause and granted the minimum tariff.

In detail, the tariff before 1914, with a general average rate of 16–34% on the value of imported goods, pressed very lightly on imports of foodstuffs; sugar was outstanding among these, however, for with a rate of 100–125% it bore the highest rate of any single article in the tariff. Duties on semi-manufactured goods as a class were higher than on foodstuffs, and in fact France applied the highest industrial tariff of central Europe. Textile yarns and metal semi-manufactures, especially heavy iron products, were highly restricted; rates on chemicals were low, except for aniline dyes. Finished manufactures were rated at a moderate level, 13–20%, although of these, finished textiles and dynamos bore a higher duty. It was, in fact, a tariff system characteristic of a moderately developed manufacturing country.

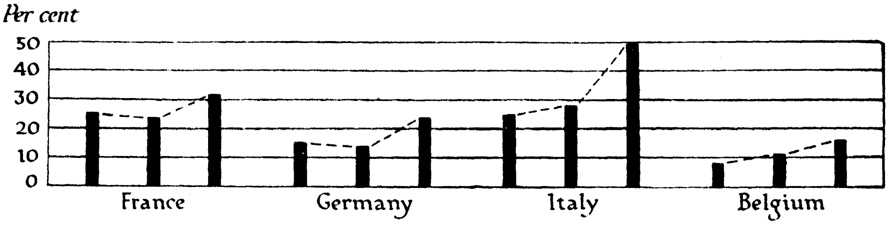
During the war of 1914–18, extensive changes in the conduct of trading relations became necessary, and the government exercised complete control of foreign trade. After 1918 new policies were proposed; the most-favoured-nation clause was unpopular, for concessions granted to low-tariff countries like Great Britain and Scandinavia had to be extended to others, a factor of increasing incidence as many countries began to increase their tariffs. It was in this atmosphere that the general tariff was raised, in 1921, from a level of 50% above the minimum to a level of 300%. The government found it necessary, however, to retain the most-favoured-nation clause in order to keep open outlets for French exports, but a compromise was adopted in the form of an 'intermediate' tariff. More and more a system of 'reciprocity' came into being, by which commercial relations were maintained on a basis of 'bargaining'. Monetary instability provided a further complication, and owing to the depreciation of the franc, customs duties were raised.

In theory France stood for a return to the liberal tariff policies of pre-war years, but in practice the tendency was strongly protectionist. Special tariff barriers were erected against goods of countries such as Germany in which the national currency had depreciated relative to that of France. In a great number of trade agreements with other countries, the French government attempted to restrict the operation of the most-favoured-nation clause, but gradually, owing to the reluctance of other powers to depart from it, the clause became reinstated. A stage in the history of the French tariff was marked in 1927 when a new agreement came to be made with Germany. In 1925 Germany had been released from the obligation, imposed by the Treaty of Versailles, to admit the Allies unilaterally to most-favoured-nation treatment, and thereafter French exports were subjected to the highest German tariff. This fact, together with the steadier price levels which followed the stabilization of the franc by the Poincaré government after the inflation, persuaded the government to make an agreement over Franco-German trade, and a convention was signed in 1927. Concessions were made by each side, and most-favoured-nation treatment was accorded to Germany. Although many duties were reduced by each government, there was a net increase of protection by each, but a step forward had been taken by the regularization and stabilization of tariff relations between the two countries. During 1928 other agreements were concluded, leading to reduction of duties and stabilization of rates, with Switzerland, Belgium, Italy, Austria and Czechoslovakia. In effect, by the

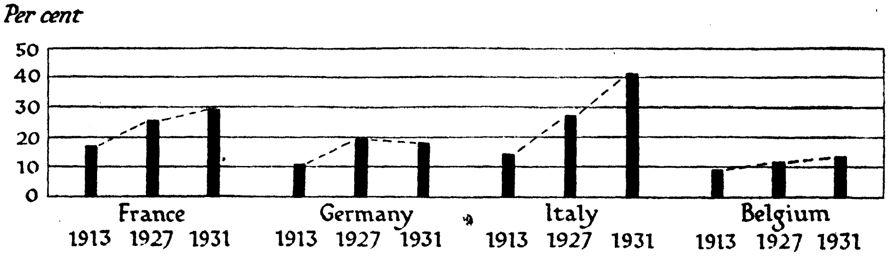
German agreement and those which followed, France had abandoned the doctrine of reciprocity and had returned to the most-favoured-nation basis of economic relations. It should be remembered, however, that tariffs were much higher than they had been before 1914.



FOODSTUFFS



SEMI-MANUFACTURED GOODS



MANUFACTURED GOODS

Fig. 99. Variations in the height of tariffs, 1913–31, in France and in neighbouring countries

From H. Liepmann *Tariff Levels and the Economic Unity of Europe*, p. 415 (facing) (London, 1938).

These graphs show 'potential tariff' levels, i.e. representative tariff levels, derived by taking averages of the normal prices of commodities making up the principal imports of each of fifteen countries in Europe from all other countries in Europe.

Effect of the World Economic Crisis

The world economic depression which began in 1929 left France relatively untouched for a time. The stabilization of the franc a few years before had given exporters a distinct trading advantage; the French gold reserves were ample, and industry enjoyed considerable activity. The stability of prices contained the seeds of future trouble, however, for as world prices increasingly declined, food-exporting countries turned more and more to the French market, and by 1931 this increase of commodity imports presented a serious threat to French agriculture. Duties on a number of agricultural products were raised, and a process of dissolution of tariff agreements began. Following the departure of Great Britain and other members of the sterling bloc from the gold standard, the French government imposed a special surtax of 15% on imports from those countries which had allowed their currencies to depreciate below their former legal parity in terms of gold. In 1932 came a special import tax of 2% *ad valorem* on raw materials and 4–6% on manufactured imports. Other less direct forms of protection were adopted such as the milling quota. In the main, however, it was chiefly duties on agrarian products, such as grain and flour, livestock, meat, dairy produce, sugar, and wine, which were increased up to the end of 1931. The effect of the increased duties can be seen in the following table:

Duties on Agrarian Commodities in France, 1913–31
(*as a percentage of prices*)

	1913	1927	1931
Wheat	34·5	23·0	180·0
Barley	23·2	13·6	39·2
Maize	25·0	17·0	39·5
Wheat flour	39·0–57·0	42·0–56·0	160·0
Pigs	24·0	10·0	36·5
Lard	37·0	27·0	73·0
Fresh pork	27·0	14·5	58·0
Raw sugar	125·0	46·0–54·0	200–240
Wine in casks	51·1	44·0–88·0	59·0–118

From H. Liepmann, *Tariff Levels and the Economic Unity of Europe*, p. 68 (London, 1938).

The protection afforded to French agriculture was extended further, and wheat prices in France, which had not been very much above world prices, were insulated from the rapidly falling free market price:

Wheat Prices in the World Market and in Great Britain, France, Germany and Italy (per bushel in dollar cents)

	1929–30		1931–32	
	Prices in cents per bushel	Prices in terms of London = 100	Prices in cents per bushel	Prices in terms of London = 100
London	131	100	59	100
Paris	145	110	174	294
Berlin	162	123	152	250
Milan	188	143	148	250

From H. Liepmann, *Tariff Levels and the Economic Unity of Europe*, p. 108 (London, 1938).

Clearing Agreements

In the years following 1931 a special feature of foreign trade relations was the rise of the clearing agreement. Many of the debtor countries of Europe, faced with a growing pressure on their currency reserves, instituted a system of control over all dealings in foreign currencies. In order to make commercial payments possible, France, like other creditor countries, established a compensation system; importers in France were compelled to make their payments to a central office, which then met the claims of exporters to the same country. As France had an adverse balance of trade with most exchange-control countries, she was in a good position to secure payment for her exporters. Clearing agreements were established with Hungary, Latvia, Estonia, Austria, Greece, Chile in 1932, and with Germany and Romania in 1934. The operation of clearing agreements, however, represented a comparatively minor activity at the time, for the value of French trade with these eight countries represented a small part of the total. By 1937 the system of clearing agreements was in process of being abandoned in favour of more normal methods of settling debts.

Imposition of Quotas

Beginning in 1931, the government sought to reduce the import of commodities, at prices which were continually becoming lower, by the adoption of quotas, so as to maintain internal prices at a figure remunerative to producers. At first designed purely as a temporary measure, the quota marked a drastic change in commercial policy, for with each quota the government fixed the quantity of any specific commodity which could be imported in a given time from the country concerned. The method was thus a complete departure from the stabilized system of tariffs which had been arrived at by 1929. Eventually the list was extended to cover nearly every product of French agriculture, and in 1939 restrictions remained on the majority.

The method was applied to many manufactured products in 1932, although there was the difference that these quotas were often arrived at by agreement with the exporting country, whereas quotas of agricultural products were determined unilaterally. The need for quotas on manufactured articles arose largely from the fact that, with the shrinkage of incomes in agricultural countries, markets for exports of manufactures declined, and competition in such a market as that of France was likely to have been intensified. By the middle of the year 1932, over 1,100 industrial products were subject to quotas.

It was at this time that the Monetary and Economic Conference met in London, in 1933, and failed to reach agreement on measures for the amelioration of the world economic crisis. The chief supporters of the quota system were France, Belgium, Holland and Switzerland, the most prominent members of the 'gold bloc'. They were all countries which were determined to maintain the value of their currencies in terms of gold, holding that stable money and deflation of domestic prices provided the best way of restoring equilibrium between internal and external price levels. France in particular was suspicious of the American attempt to raise prices by 'reflation', or a voluntary decrease in the gold value of currencies. Having experienced inflation in 1926, France did not wish to imperil the stability of her currency.

In 1934 the government attempted to extend the use of the quota system. Hundreds of industrial products were placed on the quota list, the quotas being made equivalent to the volume of trade in the articles concerned which existed in 1932. Of these new quotas, however, 75% was to be withheld until the exporting countries to which they applied agreed to make in return special concessions to French exporters. Thus an attempt was made to develop 'reciprocity' by means of the quota regulations. Some of the smaller countries made concessions, but others took retaliatory measures. Great Britain demanded full quotas and instituted surtaxes on many important French exports; eventually the full quotas were allowed and a new agreement was reached. Germany subjected a number of French exports to quota restrictions before a working agreement could be arrived at.

Eventually, it has been calculated, 65 % of all imports were covered by quota regulations. The mercantile marine was badly hit through loss of trade, and many exporting industries found that their foreign markets became restricted. In fact, the *Union française des Industries exportatrices* was formed so as to offer concerted opposition to the government policy. While some quotas had been set up in the national interest, others had been pushed through by producers directly interested, without proper investigation by the authorities. As time went on, however, the increasing complexity of the whole system led to a tendency to return to a more normal tariff regime as soon as possible. In 1936 a committee suggested the offer of a gradual suppression of quota restrictions in favour of tariff duties, as an inducement to foreign countries to make concessions in return, and a number of restrictions were abolished. The year 1936 was marked by an outstanding trade agreement with the United States of America, in which each country secured many advantages. Shortly afterwards, however, France at length abandoned the gold standard, and with a new period of currency instability the basis of international trade was changed.

Commercial Policy after the Devaluation of 1936

The Blum Government came into office in June 1936. Its social and economic reforms, with wage increases and extensive expenditure of government money on public works, had an inflationary effect, and rendered inevitable the end of the gold bloc. The Tripartite Agreement of September 1936, a monetary agreement between France, Great Britain and the United States, permitted a reduction in the gold value of the franc and aligned it with the depreciated currencies of the other two countries. The step thus taken in the direction of freer trade was in harmony with the liberal ideas of the new government. A commission was established under the presidency of M. Charles Rist, *Commission de Révision douanière*, to prepare a new system of tariffs for adoption when international agreement should eventually make possible the abandonment of the quota regime. Further, in 1937, in conjunction with the British government, the French government invited M. Van Zeeland, Prime Minister of Belgium, to undertake an inquiry into the possibility of obtaining a reduction of obstacles to trade.

The movement of events, however, made it unlikely that the labours of the Rist Commission would be profitable or that the recommendations of M. Van Zeeland would have much chance of acceptance.

Within France the depreciation of the franc and increasing difficulties in industry made it impossible for the removal of import restrictions to be considered, and the Blum Government was succeeded by new administrations. After the summer of 1937 customs barriers were raised; owing to the internal rise of production costs there was a demand for more protection. Abroad, the political situation in Europe was most unfavourable for joint action to reduce obstacles to trade. France and the other democracies were compelled rather to strengthen their economic safeguards in face of the growth of totalitarian economics.

Commercial Policy in 1938–9

The period of the Daladier-Reynaud ministry in France marked a short-lived attempt at liberation of trade. The country had made a remarkable economic and financial recovery. The successive depreciations of the currency had resulted in a removal of the disparity between French and world prices, and by 1939 the franc had become under-valued in relation to sterling. It was therefore an opportune moment for reducing customs protection. The Rist Commission for Customs Revision had practically completed its review, and favoured the suppression of industrial quotas. In August 1939 one-fifth of the quotas on manufactured goods were rescinded. It seemed likely that the Belgian government would adopt a similar course, and that other countries would follow. The outbreak of war, however, put an end to any liberalizing tendencies.

Colonial Commercial Policy

For a time, in the later nineteenth century, France tried a liberal trade policy in her colonies, and from 1866 to 1884 colonial tariff autonomy and 'open-door' treatment of foreign traders were practised. The movement of opinion, however, rapidly swung in favour of protection. A policy of commercial assimilation was applied to Indo-China in 1887–8, and was also tried in those territories where France was not bound by international agreements. Some parts of the French empire were, however, not subjected to so straightforward a protective policy. The limit of protection was reached in 1928 with the Colonial Customs Act, by which the assimilated colonies were to enjoy free trade with the mother country and to have virtually the same tariffs. The system amounted to 100% preferences both ways.

The tariff regime differs among the various parts of the Empire, and the colonies may be divided into the following groups:

(1) Algeria, standing in a special category, being within the French customs unit, and Tunisia, which enjoys a broadly similar position.

(2) 'Assimilated' colonies: Indo-China, Madagascar, Guadeloupe, Martinique, French Guiana and Réunion; in these the customs tariff of France is applied to imports from foreign countries, and all form a customs union with the metropolitan territory.

(3) Non-assimilated colonies, giving preference to France: New Caledonia, Oceania, St Pierre and Miquelon, French Somaliland, the West African colonies and part of French Equatorial Africa. In return, certain colonial products have free entry into France. Other goods exported to France are subject to the minimum tariff.

(4) Colonies over which France does not enjoy complete control of fiscal affairs:

(*a*) Morocco. An 'open-door' regime was established in 1906 by international agreement, and when France assumed a Protectorate over the French zone in 1912 an 'open-door' pledge was again given.

(*b*) Some territories of French Equatorial Africa—a small part of Gabon, most of Moyen Congo, and part of Ubangi-Shari, are administered according to the Congo Basin Treaty of 1885. Import and export duties apply to all trade without discrimination.

(5) French India. Owing to the importance of transit trade in the Indian possessions of France, a free-trade regime is in force.

(The Mandated Territories of Togoland, Cameroons, Syria and Lebanon are subject to supervision in trade matters by the League of Nations.)

Other means have been adopted for encouraging trade between France and the colonies, such as subsidies to enterprises engaged in exploitation, shipping subsidies, etc. Far-reaching restrictions are placed upon penetration by foreign capital unless two-thirds of the control is in French hands. It is probably for this reason, in part at least, that the resources of the colonies are not more developed.

Quotas in Colonial Policy

With the onset of the world economic depression more attention was paid to the possibility of further development of colonial trade. Various reasons existed for this attitude, but the chief were the shrinkage of French export markets in foreign countries, and the attraction of the high-price French market for the exports of the colonies as the world price of primary products declined. The quota system, introduced in 1931, did not apply to French colonial products, so that colonial producers enjoyed in France a market in which competition from foreign countries was greatly reduced. In return, the metropolitan government limited by quota the imports into the colonies of manufactured articles from foreign countries, so as to benefit the French exporter.

In 1934 a Colonial Conference met at Paris, to discuss further means of developing the trade for the whole Empire. More subsidies and increased expenditure on local improvements were planned. An attempt was to be made to divert as much as possible of colonial production to commodities which were complementary to French agriculture rather than competitive with it. It was hoped that the colonies would provide increasing outlets for French manufactured products. In short, France committed herself to a more extreme development of the Ottawa principle, and M. Reynaud described it in 1935 as a 'closed system'. (See also p. 294.)

It should be remembered that the question of 'assimilation' and non-assimilation is still unsettled. A number of authorities hold that the assimilated status should be applied to all the remaining French colonies, some on the ground of the benefits to French trade which would ensue, others because they would prefer to see a more logically complete system of trade relations which would apply to every part of the empire. No colony of the unassimilated group has yet applied for admission to the assimilated group, for the benefits of closer contact with the French market seem to be inferior to those derived from more open access to the world market.

MERCANTILE MARINE

The total maritime traffic using French ports in 1937, the latest year for which detailed figures are available, was 57,748 ships with a tonnage of 111,744,000 tons (entered and cleared). With the excess inward balance of cargo which France experiences, there was a considerable number of vessels sailing outwards in ballast.

Shipping Movement in 1937 (*tonnage in thousand of tons net*)

	With cargo		In ballast		Total	
	Number	Tonnage	Number	Tonnage	Number	Tonnage
Entered	27,363	54,670	1,152	888	28,515	55,558
Cleared	18,441	44,195	10,792	11,991	29,233	56,186
Total	45,804	98,865	11,944	12,879	57,748	111,744

In distribution by flags it is interesting to note that the tonnage of British vessels using French ports exceeded that of French vessels, and was not far short of the tonnage of all other foreign shipping. Of other foreign flags, the German and Italian were next, though far behind, and the American, Netherlands and Norwegian flags were represented by considerable quantities. It must be remembered that the British figures are swollen, to some extent, by the cross-Channel services, in which French ships play a smaller part.

Movement of Shipping by Flag (including long-distance fishing). Entries only (with cargo); tonnage in thousands of tons net

Flag	1937		1938	
	Number	Tonnage	Number	Tonnage
French	8,274	15,459	7,935	15,136
British	9,795	17,232	8,729	16,004
German	1,034	5,053	918	4,685
Italian	1,431	4,450	1,212	4,351
Netherlands	1,378	2,704	1,352	2,949
American	377	2,714	345	2,479
Norwegian	1,302	2,087	1,295	2,251
Danish	787	930	701	869
Swedish	775	741	533	519
Greek	306	544	208	393
Japanese	78	443	61	367
Belgian	292	231	255	217
Soviet	105	187	61	118
Spanish	435	238	83	25
Others	994	1,657	907	1,628
Total	27,363	54,670	24,595	51,991

From *Annuaire Statistique 1938*, p. 133 (Paris, 1939).

French vessels are responsible for carrying about 40% of French imports and about 60% of the exports. The predominance of Great Britain in French shipping relations is further shown by a statement of the amount of tonnage trading to and from each country.

1937. *Gross Tonnage of Shipping Trading between France and other Countries (thousands of tons)*

	Country	Tonnage
1	Great Britain	33,423
2	U.S.A.	16,622
3	Algeria	9,560
4	Germany	8,002
5	Italy	7,197
6	Egypt	6,470
7	Netherlands	5,083
8	Belgium	4,681
9	Portugal	3,854
10	Argentine	3,444
11	French West Africa	3,282
12	Brazil	2,790
13	French Morocco	2,701
14	Uruguay	2,538
15	India	2,502

From *Tableau Général de la Navigation Maritime, 1937*, pp. 38–9 (Paris, 1938).

State of the Mercantile Marine

Position in 1939

In 1939 the French mercantile marine ranked eighth among world fleets after those of Great Britain, U.S.A., Japan, Norway, Germany, Italy, and the Netherlands.

World Shipping, 30 June 1939 (steam and motor ships)

	No.	Gross tonnage (thousands)
Great Britain and Northern Ireland	6,722	17,891·1
U.S.A. (sea-going)	2,345	8,909·9
Japan	2,337	5,629·8
Norway	1,987	4,833·8
Germany	2,459	4,482·7
Italy	1,227	3,424·8
Netherlands	1,523	2,969·6
France	1,231	2,933·9
Greece	607	1,780·7
Sweden	1,231	1,577·1
Denmark	705	1,174·9
Others	6,881	10,449·4
World total	29,255	66,057·8

From *The Statesman's Year-Book, 1941*, xxi (London, 1941).

It is clear that, considering the place of France as a great power and the magnitude of her overseas trade, the mercantile fleet is a relatively small one. Unlike the fleets of Great Britain, Norway and the Netherlands, it plays little part in the world tramp business. Compared with 1914, the percentage of world steam and motor tonnage under the French flag has remained practically unchanged, being 4·2 in 1914 and 4·3 in 1939, although the tonnage of the fleet has increased by just over 1 million gross tons, or 50 %.

The classification of the French mercantile fleet (steamers and motorships only) by tonnage in 1938 was as follows:

					No.	Gross tons
Over	100 tons	and	under	500	592	137,864
,,	500	,,	,,	1,000	83	60,618
,,	1,000	,,	,,	2,000	126	183,687
,,	2,000	,,	,,	4,000	199	579,022
,,	4,000	,,	,,	6,000	124	611,512
,,	6,000	,,	,,	8,000	41	285,976
,,	8,000	,,	,,	10,000	42	375,774
,,	10,000	,,	,,	15,000	27	312,529
,,	15,000	,,	,,	20,000	7	114,235
,,	20,000 tons				5	219,566
	Total				1,246	2,880,783

For a more detailed classification of ships by tonnage for 1939 see Table 6.

The fleet in 1938 could be analysed by categories as follows (steam and motor ships of 100 gross tons and upwards):

Class	No.	Thousand gross tons	Percentage by tonnage of world total, in each category
Steam and motor	1,246	2,881	4·3
Motor ships	207	345	2·3
Oil-burning steamships	209	1,161	5·8
Tankers over 1,000 tons (steam and motor)	40	242	2·3
Refrigerated ships (1935)	81	643	6·0

Thus in motor shipping, the category which has expanded most in the world's merchant fleets in recent years, the French fleet was relatively deficient. It was particularly deficient in tankers:

Tanker Fleets, of ships over 1,000 *tons gross,* 1 *July* 1937

World fleet		10,000,000 tons (gross)
Great Britain	454 vessels	2,530,000
U.S.A.	394	2,570,000
Norway	250	1,850,000
Netherlands	93	440,000
Italy	72	350,000
France	40	242,000
Japan	—	220,000
Germany	27	160,000
U.S.S.R.	24	120,000

The French tanker position was improving rapidly, however, and in September 1939 the fleet numbered seventy-six of over 350,000 tons, with a carrying capacity of 400,000 tons, and capable of bringing to France 35–40% of the country's total petroleum imports (see p. 271). (See also Table 6.)

In 1938, the laid-up tonnage amounted to 185,000 tons of steam and motor shipping, of all types, having steadily declined from the figure of 1,093,000 tons in 1932.

Age of the French Fleet

The French fleet resembled the Japanese in approximating to the world average in the age of its ships; of the leading shipowning states, however, only the United States and Italy had a higher proportion of old vessels. It was estimated that the percentage of French ships over 15 years old was 75 for cargo vessels, 56 for mixed passenger and cargo liners and passenger liners, and 43 for tankers. As the normal life of the average merchant ship is reckoned at 25 years, the position caused much concern in France. It was held that the construction of 160,000 tons of new shipping annually for ten years was required to maintain the merchant fleet at a satisfactory level.

Shipping Companies

Of the companies engaged in ship operation in 1939, there were 42 which owned more than 10,000 gross tons of shipping (of ships over 1,000 tons) and accounted for 85 % of the total steam and motor tonnage of the country. Only twelve companies owned over 50,000 tons of shipping, however, and of these only three could be called important companies—*Compagnie Générale Transatlantique*, '*C.G.T.*' (447,486 tons), *Messageries Maritimes* (359,034 tons) and *Chargeurs Réunis* (276,953). (For further details of shipping companies see Table 6.) Relations between the various companies are close, and several working agreements exist.

The shipping companies also maintain close relations with most of the shipbuilding companies through a system of interlocking directorates. Thus a director of *Ateliers et Chantiers de St Nazaire Penhoët* is represented on the boards of *Chargeurs Réunis*, *Fraissinet* and *Cyprien-Fabre*. *Ateliers et Chantiers de St Nazaire Penhoët* had been founded by *C.G.T.* in 1861 and established as a separate concern in 1901, but until recently the connexion was maintained by a mutual exchange of directors.

GOVERNMENT AID TO SHIPPING

In France, as in all other shipowning countries, assistance from the state has become increasingly necessary in recent years. It has taken the form of operating subsidies, participation in capital reorganizations, and several forms of subsidy for the building of new ships.

Mail Subsidies

A subsidy of long standing has been the payment of grants for the carriage of mails. Subsidies budgeted for in 1939 amounted to 575 million francs, of which over half was received by the *Messageries Maritimes* company.

The rise in the working deficits of the four subsidized companies led the government in 1937 to set up a system of control over financial arrangements and working of the four companies concerned. In 1938 was instituted the post of government commissary and technical controller, directly subordinate to the Minister for Mercantile Marine, who was to exercise a technical control over their working.

Other Subsidies

Apart from the direct mail subsidies, assistance was also provided for the shipping industry by the so-called Tasso Law, of 1934, under which payment was to be made of sums varying with the tonnage in service, with the speed of the vessel, and with the area served. New construction was encouraged by the obligation imposed upon companies receiving over 1 million francs in subsidies in any year to devote 20% of the total to the building of new tonnage. Other assistance was given to shipping in 1936—a further subsidy of 110 millions, of which 60 millions were allocated to shipping in receipt of mail subsidies. The subsidies were intended to compensate shipowners for the increased costs due to the social legislation of that year. A further 50 millions were provided in the 1937 Budget to cover allocations until 31 March 1937, when the subsidy lapsed.

Assistance to Oil Tankers

In 1925, in order to encourage the development of a French oil-tanker fleet, half the receipts of the National Liquid Fuel Office from the duty on imported gasoline, etc. was allocated as a subsidy for oil tankers built in France, or for tankers less than 15 years old purchased abroad. The duty on imported petroleum products was doubled in 1938, and fresh resources were allocated for subsidies to be distributed amongst the tanker fleet. Yet further assistance to the oil-tanker fleet was accorded in 1938 when provision was made for subsidies up to 1944 for tankers built in France, or in certain cases for vessels purchased or built abroad. The assistance was restricted to vessels of over 6,000 tons.

A further step was taken in the same year when it was decided that the remainder of the resources provided by the duty on gasoline, etc. should be devoted to the development of the tanker fleet, and arrangements were made for the state or the National Liquid Fuel Office (merged with the Ministry of Public Works in 1939) to participate in the financing of the tanker business. As a result the office joined with several other concerns to form the *Société Française de Transports Pétroliers*, of which it provided 30% of the capital of 30 millions. This company eventually owned a tanker fleet of 100,000 tons. Yet further assistance was afforded to oil tankers by the operation of a decree of 1937, which required all importers to carry at least 50% of their imports in vessels under the French flag or in foreign vessels of which the charter party had been approved by a special committee.

The Maritime Credit System

In order to hasten the renovation of the remainder of the mercantile marine, the government in 1938 extended the Maritime Credit system so as to encourage shipowners in the laying down of about 500,000 tons within the next three years. Early in 1939 came various supplementary measures for ensuring the immediate construction of 100,000 tons of shipping, and designed to make good the difference between shipbuilding costs in France and abroad. Special attention was devoted to the construction of vessels little represented in the French merchant fleet and which were of national importance, such as colliers of less than 1,800 tons, vessels for the transport of ground-nuts or heavy or cumbersome goods, and cold-storage vessels. The provision for developing the French collier fleet was of particular importance to British shipping, which had hitherto been better able to retain its proportion of the coal-carrying trade to France owing to shortage of small French colliers. The supplementary allocations under the new measures were to be smaller in the case of passenger liners, mixed passenger and cargo vessels, ordinary cargo vessels, and trawlers.

The position of the Leading Company

In 1931, the financial position of the *Compagnie Générale Transatlantique* became seriously embarrassed. The state was compelled to intervene, and finally in 1933 the company was reorganized and a convention established between the company and the state. The state guaranteed the service of a loan to be floated by the company to a maximum amount of 150 million francs, and acquired the right to appoint a number of directors in proportion to its share of the capital, but in no case less than a third of the total. In 1937, for the first time since the reconstruction, the special working account set up in 1933 showed a small favourable balance. A further decree of 1938 provided for a further reorganization.

The company's investment in the *Normandie* was much discussed in French circles, but it was claimed that, far from being a liability, the ship proved to be a technical and commercial success, and greatly enhanced the national maritime prestige. A parliamentary report in

1938 found the following results for the first nine voyages of the ship:

Thousands of francs

	1935	1936	1937
Average cost per voyage	4,150	4,100	6,100
Average receipts per voyage	5,450	5,500	9,100
Average yield per voyage	1,300	1,400	3,000

A sister ship to the *Normandie*—the *Bretagne*, 83,000 tons gross, turbo-electric drive—was planned for laying down in 1940.

The two other principal shipping groups, the *Chargeurs Réunis* and the *Messageries Maritimes*, also suffered heavily from the adverse shipping situation, and found great difficulty in meeting financial charges.

State-Owned Ships

In 1938, the state owned 80,000 tons of shipping, mainly engaged in conveying goods such as coal for the railways; others were operated by the posts and telegraphs services and the colonial governments. This total also included twelve vessels leased at favourable rates to the subsidized mail companies operating services to Algeria and Corsica. In addition, three 9,000 ton motor cargo vessels and two fast motor banana carriers of 5,600 tons, constructed under the Blum plan to reduce unemployment, were almost ready in 1939 to be leased to leading shipping companies.

Reservation of Traffic to French Shipping

Traffic along the coast and between French ports and Algeria has long been reserved to shipping flying the French flag, but during recent years other measures have been taken to increase the proportion of French trade carried in French ships. In 1934, the government took power to restrict to national vessels the carriage of colonial products from the French colonies to France, although this power had only been exercised in the banana trade, certain exceptions even in this traffic being permitted. A decree of 1935 required French shipping to be used for the carriage of goods for the state and for public services such as gas and electricity companies, railways and shipping companies. A further decree of 1936 contained a provision that, except for existing international agreements and subject to power given to the Mercantile Marine Ministry to grant exemptions, at least 40% of the imports into France of foreign coal by sea should be carried in French ships. In 1936, under the Blum Government, further subsidies to shipping were provided, equal to the increased costs arising from higher wages following the collective agreements reached between employers and employees.

Social Legislation

Under the Blum Government the 40 hr. week legislation and provision for an 8 hr. day were extended to the mercantile marine and the high-sea fishing industry in 1937. The reform was estimated to cost shipowners some 120–130 million francs a year. Further legislation regulated the system of paid holidays for sea-going personnel, and set up machinery for conciliation and arbitration in the case of labour conflicts. These measures were criticized on the ground that they accentuated the difference between the treatment of seamen in the French and foreign merchant fleets. The 40 hr. week was put into operation in France at a time when the 56 hr. week instituted by the International Convention of 1936 was not enforced elsewhere, and when the Convention itself had not been ratified.

Inquiry into the Situation of the Mercantile Marine

In 1937, the Mercantile Marine Ministry set out to examine the situation of the merchant fleet and to make recommendations for its reorganization and renovation. The committee did not receive sufficient information to enable it to come to many conclusions, but it drew attention to the drop in recruiting for officers in the mercantile marine and the steady fall in the number of suitable candidates, which seemed likely to result in an actual shortage of deck officers in the comparatively near future. The table on p. 313 illustrates the situation.

The numbers of sea-going personnel engaged in the merchant marine (not including sea fisheries) in 1938 were as follows:

	Navigating personnel	Engine-room staffs	General personnel	Total
Long-distance trade	8,367	6,260	7,434	22,061
Coasting trade	11,564	6,382	2,029	19,975
Total actively engaged	19,931	12,642	9,463	42,036
Numbers not at sea				17,273
Others				4,445
Grand total				63,754

From *Annuaire Statistique, 1938*, p. 131 (Paris, 1939).

Certificates Granted in the Mercantile Marine 1921 *and* 1925–38

									Engineers			
Year	Merchant marine, officer cadets	Foreign trade		‘Extra’ masters	Coasting trade		Limited coasting trade masters	Engineer cadets	First class	Second class	Third class	
		Officers	Masters		Masters	Officers					Steam-ship	Motor vessel
1921	292	12	18	83	198	—	—	4	122	241	78	3
1925	164	109	67	62	12	72	16	28	70	77	18	3
1926	162	136	101	68	5	66	48	59	43	88	37	4
1927	214	147	153	100	2	69	34	53	63	150	79	9
1928	175	140	154	81	2	53	50	61	78	103	89	12
1929	151	137	127	90	—	29	40	24	74	90	70	20
1930	169	156	160	71	—	48	54	42	101	120	77	20
1931	166	181	146	57	1	41	54	34	70	135	69	33
1932	103	98	110	53	—	21	63	28	88	85	58	34
1933	87	95	123	29	—	12	53	27	83	76	52	38
1934	95	97	101	31	—	16	31	26	79	90	25	22
1935	74	69	97	61	—	12	15	24	86	54	18	22
1936	50	56	63	69	—	20	55	24	88	61	34	30
1937	68	63	110	29	—	32	61	23	80	54	26	50
1938	61	60	68	31	—	32	80	13	78	65	60	67

From *Annuaire Statistique, 1938, Partie Retrospectif*, p. 99 (Paris, 1939).

There are ten schools in France maintained by the state for training in navigation. These are situated at Bordeaux, Boulogne, Brest, Dunkirk, Havre, Lorient, Marseilles, Nantes, Paimpol and St Malo. There are private schools of hydrography at Brest, Dieppe, Dunkirk, and Fécamp, as well as a school at Bordeaux maintained by the Eighth Economic Region.

FINANCE

THE BUDGET

The budget estimates for 1939 were as follows (millions of francs):

Revenue

1. DIRECT TAXATION			20,794
(i) Income tax, Super tax, etc.		14,107	
(ii) Taxes on dividends		6,687	
2. INDIRECT TAXATION			36,652
(i) Taxes on transactions:			
(*a*) Registration of property, contracts, etc.	4,086		
(*b*) Stamp duties	2,730		
(*c*) Duties on Stock Exchange transactions	224	7,040	
(ii) Customs duties		10,401	
(iii) Drink, alcohol, sugar, saccharine, etc. duties		7,339	
(iv) Turnover tax		11,872	
Total tax revenue			57,446
3. OTHER RECEIPTS			8,941
(i) Products of state monopolies, etc.		607	
(ii) Revenue from national property		480	
(iii) 'Recettes d'ordre'		4,749	
(iv) Miscellaneous		3,091	
(v) Receipts from Algeria		14	
Total revenue			66,387

Expenditure

President of the Council	22
'Economie Nationale'	57
Finance	32,778
Justice	426
Foreign Affairs	464
Interior	2,652
National Defence	7,783
Navy	2,672
Air Ministry	2,672
Education	4,427
Commerce and Industry	245
Labour	2,054
Public Health	1,623
Colonies	1,103
Agriculture	982
Public Works	2,206
Merchant Marine	1,079
Pensions	3,670
Total, ordinary budget	66,565

Extraordinary budget		
National defence:		
War	10,553	
Navy	5,400	
Air	9,211	
Colonies	453	
Agriculture, Public Works, Interior	226	25,822
Civil requirements:		
Finance	1,484	
Education	22	
Agriculture, Public Works, Interior.	67	1,573
Total		27,395

From *Annuaire Statistique, 1938*, pp. 233–5 (Paris, 1938).

It will be noted that expenditure is grouped under two headings: the ordinary and the extraordinary budget.

Apportionment of Taxation

An important feature of the French budget is the relatively small proportion which is provided by direct taxation. In 1939, for example, out of 57,000 million francs of tax revenue budgeted for, only 20,800, or 36 %, were to be drawn from direct taxation, principally income tax and super tax. This characteristic distinguishes the French budget from that of the United Kingdom, in which, in 1939–40, 48 % of the tax revenue was expected to be drawn from direct taxation. Of the total budget income in France, 36,000 million francs were expected from indirect taxation, i.e. taxes on the business transactions, purchases, and entertainments of the population. Outstanding among the indirect taxes were the turnover tax, producing nearly 12,000 million francs, and the customs duties, producing 10,000. The proceeds of the customs, therefore, were responsible for nearly one-sixth of the entire budgetary income of the government. (In 1938 both the customs revenue and the turnover tax revenue, each at about 9,000 million francs, produced more than the whole of the direct taxation.) The remaining sum, of nearly 9,000, was to be derived from miscellaneous sources.

The structure of the French budget is based upon fiscal practice established by Napoleon Bonaparte, subject to little subsequent change. Income tax was not, in fact, introduced until 1917, and until several years had passed it produced little revenue. The tax is levied on two bases—the general tax on the total income above a certain level, and a tax according to four schedules, under which the rate varies according to the profession of the taxpayer. The tax was paid by something over two million citizens during the years before the recent period of rearmament. While this figure appears low, it must be remembered that the proportion of large incomes in France is much smaller than in Great Britain or America. For a long time the public had resisted the idea of an income tax, and there seems to be little doubt that considerable evasion of the tax takes place. It is difficult to estimate the precise extent of this evasion, and the matter is the subject of political controversy. Socialists recommend the drastic step of inspection of bank accounts, but the *bourgeoisie* is strongly opposed to 'fiscal inquisition'. Various proposals for reducing evasion have been considered by parliament. A few years ago experts from the treasury estimated the loss incurred on the general income tax as at least 800 millions, but the association of taxpayers maintained that it did not exceed 250 millions.

The latest figures of the yield of the income tax are those of 1937, when the net product was as follows:

	Million francs
General income tax	1,758·5
Schedules:	
Industry and commerce	2,019·8
Salaries, pensions, etc.	672·4
Liberal professions	150·8
Grants, appointments, offices	43·0
Agriculture	23·1
Total	4,667·6

From *Annuaire Statistique, 1938*, p. 240 (Paris, 1939).

The most striking figure of the table is the very small contribution by the agricultural classes. It is true that most farmers have very small properties, but it seems fair to say that agriculture in France is lightly taxed.

Expenditure: Ordinary and Extraordinary Budgets

In 1939, of the ordinary budget, a very great part of the expenditure was incurred in meeting the interest charges on the national debt, and in recent years this cost has absorbed up to 50% of the revenue. As in more than one country, this charge is a considerable burden. An item of expenditure which bears more heavily upon France than in any other country is the pensions arising from French casualties in the war of 1914–18.

A prime feature of French budgetary arrangement since 1936 has been the relegation of certain expenditures to the extraordinary budget. These expenditures represent, in the main, sums which it is considered cannot be raised by taxation, and which can only be found by borrowing. In 1939, therefore, while the ordinary budget showed an approximate balance between income and expenditure, the amount set aside in the extraordinary budget—27,395 million francs—represented a deficit. By far the greater part of this budget arose from the need to rearm, although other items of expenditure were included. The true budgetary position of France in recent years may be summarized as given in the table on p. 317.

The Budget Deficit

The problem of the French budgetary deficit has for long been serious, and in the past twenty years has given rise to recurrent crises.

It is possible that to the British public, more accustomed to the rigours of orthodox finance, the French budgetary deficit appears more serious than it does to the French public. There is little doubt, however, that this lack of equilibrium is a handicap to the financial well-being of the country. A variety of causes have been adduced to account for the recurrent deficit, though none of them goes very far to explain it. It does not arise from the adverse balance of trade, for in most years the invisible items have gone far to redress the situation. It is not directly associated with the political situation in France, for deficits of some magnitude occurred long before the advent of the Front Populaire government. Some critics, both inside and outside France, claim that a principal cause is the reluctance of the French public to bear the burden which would be required in an attempt to balance the budget, by vigorous imposition of direct taxation and reduction of expenditure. Some authorities maintain that France cannot bear such burdens; others claim, on the other hand, that the public is willing to make very great sacrifices, as long as it is asked to do so by a government which can create confidence in French credit, both at home and abroad. The progress made during M. Reynaud's tenure of the Ministry of Finance lends some support to this view.

Year	Million francs		Total deficit
	Deficit on ordinary budget	Additional sum voted for extra-ordinary budget	
1936	10,000	12,000	22,000
1937	8,000	16,000	24,000
1938	?	14,200	?
1939	—	27,400	27,400

The budgetary deficit acts as a drag on business enterprise. In a country largely dependent upon indirect taxation there is thus a lack of that prosperity which would create a buoyancy of revenue. The deficit has to be met by borrowing, and this borrowing is a burden upon the economic life of the country in two ways. It is difficult for the French government to borrow money at rates as low as those which can be obtained by the governments of Great Britain or U.S.A. (In some years, for example, the government has found it difficult to borrow at 7 %, even.) As a result there is little capital left which might be borrowed at reasonable rates by industry; the situation is all the more pronounced in times of depression, which is just the time when industry needs more capital.

The second way in which the borrowing necessitated by the deficit hinders progress is in its effect upon the confidence of traders and investors, both at home and abroad. With any succession of large deficits the government can only borrow from the Bank of France, and with the piling up of debt the holders of any profits, currencies or other capital, see the possibility ahead that the franc will have to be devalued (or reduced in value in terms of foreign currencies). In this situation foreign investors are loath to send their capital to France in spite of the higher rate of interest prevailing there, for they fear that with a devaluation of the franc they will incur a loss when the investment is ultimately reconverted into the original pounds or dollars. Many prefer to keep their resources in the form of currencies other than the franc, and many send their capital abroad for investment in foreign loans and other holdings. Thus originates the flight of capital, which is simply a reflexion of a loss of confidence in the government's financial policy. Whenever a more intelligent and vigorous financial policy is in sight, confidence returns and capital flows back into France. The budgetary situation is, in fact, intimately bound up with the financial stability of the country, and there seems to be little doubt that the restoration of a more orthodox fiscal policy is essential to the prosperity of France.

NATIONAL DEBT

The internal national debt in recent years has stood as follows (millions of francs):

	1 January 1938	1 August 1939
Perpetual debt	50,038	55,036
Amortizable debt	232,853	247,015
Medium and short-term debt	35,992	106,649
Debt to the Bank of France	51,343	36,042
Total	370,226	444,742
Other internal public debts:		
Railways	89,000	
Debt of departments	11,000	
Debt of municipalities	28,000	

* The amount of the debts in these categories in this year stood at approximately the same figure; the amount does not vary much from year to year.

For the year 1939 the total interest on the internal debt amounted to 34,500 million francs.

The *external* debt on 31 August 1938, amounted to 4,535 million francs, exclusive of war debts; the interest on this debt amounted to 156 million francs.

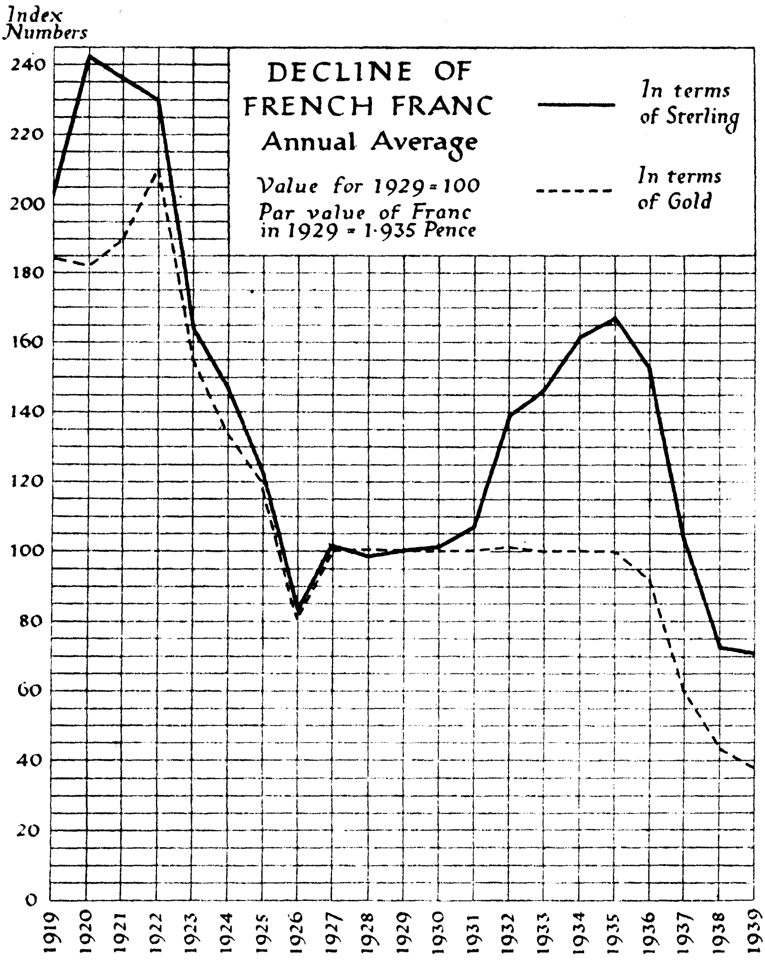


Fig. 100. The decline of the French franc, 1919–39

It should be noted that the graphs show the value of the franc, in terms of sterling or gold, in each year as a percentage of its value in 1929. The values given are annual averages, which are higher than the minimum and lower than the maximum value for any given year; thus the exceptional low value of 240 francs to the pound which was reached for a time in 1926 is concealed by the value of the annual average for that year.

CURRENCY

The currency unit of France is the franc of 100 centimes. The circulating medium is principally notes of the Bank of France, above 20 francs in value. In 1932, 5, 10 and 20 franc notes were withdrawn from circulation and replaced by silver coins of a nominal value of 5, 10 and 20 francs.

The value of the franc has varied considerably in relation to sterling in the past 20 years, reaching a minimum, for a time, of 240 to the £ in 1926. Following its recovery, under the Poincaré Government, to 124, it remained at that value until 1931. Then followed a rise until it reached 75 in 1935. A second decline in relation to the pound sterling succeeded. In June 1937 the gold standard was abandoned; for some time afterwards the franc was a 'floating' unit, until in May 1938 the government decided to 'peg' the value of the franc in relation to sterling, at a minimum value of 179. In 1939 the average rate was 170 to the £.

The tendency of the French currency unit to fluctuate violently, largely as a reflexion of confidence in the government's financial policy, has led to recurrent debate on the stabilization of the franc. Stabilization at a level which later turned out to be ill-advised would be a costly experiment to the nation. On the other hand, an exchange left free to fluctuate would allow currency speculators to raise or depress the value of the franc. Various sections of the public have divergent interests in the matter. Those with fixed sums to receive in francs, as interest or salaries, prefer stabilization at a relatively high level. Exporters, though mainly desiring a permanent level, favour a lower rather than a higher value, as an advantage in competitive markets. The interest of the taxpayer, finally, is served better by a depreciated value, since much of the public expenditure is consumed in the service of the national debt.

BANKING AND CREDIT

Central Bank

The central bank is the Bank of France, founded in 1800, and placed under state control in 1886. It has held a monopoly of issuing bank-notes since 1848. In 1936 the constitution of the bank was radically reformed so as to bring it more under government control. The capital is fixed at 182,500,000 francs. The bank keeps a minimum reserve of 35% gold against outstanding notes and other demand liabilities.

The Bank of France maintains 177 branches, apart from its head office—18 in Paris and the suburbs and 159 in the provinces—organized so as to keep in touch with local conditions. The bank comes into contact with the French public through the great number of its deposit accounts and through the universality of the bill discount business, often for very small sums.

Savings Banks

There are two groups of savings banks for small investors in France, the 'ordinary' and the 'national'. At the end of 1938 the number of depositors was as follows:

	Amount of deposits, million francs	No. of depositors	Average value of each deposit, francs
National Savings Banks	26,041	10,575,800	2,462
Ordinary Savings Banks	37,460	10,493,200	3,495

Contrasts between English and French Banking Systems

The atmosphere and conditions of French banking and financing differ from those in England, and arise from the characteristics of French economic life. The velocity of circulation of goods and services is relatively low owing to the more limited effective demand in a predominantly rural economy, coupled with the marked thriftiness of the population. Further, in France there is a much smaller volume of business in foreign services (shipping, foreign bills and credits, insurance, etc.) which in England make an important contribution to national prosperity.

The division of function between banks and other credit institutions is not so rigid in France as in England, where the five great joint-stock banks adhere rather closely to short-term operations, and leave other types of credit provision to special organizations. Nor do the French commercial joint-stock banks exercise the same predominance as the English 'Big Five' over the economic and banking activities of the country as a whole, although they have strengthened their position in recent years. Moreover, the population employs the banknote rather than the cheque for ordinary payments, even of comparatively large sums, far more than is done in England, and it is thus in the habit of keeping large sums in its possession, instead of depositing them in banks. Savings are more often invested by small sums in securities than placed on deposit in a bank.

General banking conditions are also affected in France by certain permanent social characteristics, such as the universal practice of thrift, the continuing and widespread family ownership and family direction of business enterprise, the close social and group solidarity, and the financial solidarity within families leading to reinvestment in the family business, all of which have their influence on the evolution of French banking. The comparatively even distribution of wealth, the relative abundance of small capitalists willing to invest locally, the considerable number of special firms managing private fortunes—such factors as these also affect banking structure and practice.

In addition to the familiar banking institutions usual in highly developed communities, credit facilities are provided in France by a multitude of other organizations, state, semi-state, or private in character. The provision of ordinary commercial short-term credits and of temporary accommodation is mainly the affair of the commercial joint-stock and other deposit banks. 'Medium-term' credit, normally allowed for a period of two to five years, is provided to a limited degree by the joint-stock banks, but it is mainly the preserve of the 'business' banks (*banques d'affaires*) and of certain other specialized institutions. Long-term credit is provided by many organizations, including both the *banques d'affaires* and the other institutions created to finance important specific industries. The boundary line between medium-term and long-term credit is, however, by no means clearly drawn; the same guarantees of recovery are required for either type.

The leading Commercial Joint-Stock Banks

The largest joint-stock banks are: *Crédit Lyonnais* (1863), capital 400 million francs; *Société Générale* (1864), capital 625 millions; *Comptoir Nationale d'Escompte* (1889), capital 400 millions; *Crédit Commercial de France* (1894), capital 200 millions; *Banque Nationale pour le Commerce et l'Industrie* (recently founded), capital 140 millions; *Crédit Industriel et Commercial* (1859), capital 100 millions. These banks have their headquarters in Paris, although the *Crédit Lyonnais* still keeps its legal headquarters at Lyons.

There are still a large number of independent banks of varying size in the provinces. The largest are the *Crédit du Nord* of Lille, with a capital of 137·5 millions, and the *Société Marseillaise de Crédit Industriel* of Marseilles, with a capital of 100 millions. Independent local banks are found in over twenty other cities. Such banks have not disappeared from the French provinces to the same extent as in England, despite the marked tendency for the Paris banks to oust competitors, either through absorption or through their ability to offer better facilities owing to their vast resources.

Industrial or 'Business' Banks

The French banks known as *banques d'affaires* are normally concerned with the launching or development of industrial and commercial enterprises, and conduct both home and foreign business. They have invested abroad in railways, ports, public utilities, mines, real property or industrial and commercial enterprises, and place foreign loans, both public and private, on the French market. They have suffered more severely than other branches of the French banking system from the difficulties which have affected the service of foreign loans in recent years. The greatest of these banks cover all kinds of industry and commerce and operate in almost every part of the world; of the smaller banks, some deal with most classes of business, others confine their activities to a few selected branches, whilst yet others specialize in one or more foreign territories. The business banks are not competitors of the commercial joint-stock banks; they do not receive deposits from all and sundry, but prefer to operate accounts principally with large customers, notably the firms which they finance.

Among these banks the greatest is the *Banque de Paris et de Pays-Bas* (capital 300 millions), with branches in Amsterdam, Brussels and Geneva. In France it has large interests in leading banking and insurance companies and is connected with banks in many foreign countries. In industry it has been prominent in the financing of public utility schemes. Another leading business bank is the *Union Parisienne* (capital 200 millions), with interests in Romania, Poland, Greece and South America; in France it has been concerned with the financing of public utilities and metallurgical interests, especially with the Schneider group. About ten other important banks undertake the financing of general industrial business and some specialize in different countries. Another group of banks mainly operating abroad, often connected with the joint-stock or business banks, includes *Crédit Algérien*, *Crédit Foncier d'Algérie et de Tunisie*, *Crédit Foncier de l'Indo-Chine*.

Private Banks. Many of the larger private banks also carry on general industrial and commercial financing. *Rothschild*, *Mirabaud*, *Hottinguer*, *Vernes*, *Demachy*, *de Neuflize*, *Mallet*, *Lazard Frères*, and *Dreyfus* appear frequently in industrial business, and their representatives are often found on company directorates.

Other 'business' Credit Institutions. The official *Crédit National* is also an important source of credit for industry, while industrialists and financiers have also combined to provide medium- or long-term credit, for industry generally or for specific branches. Some of these credit organizations have attained great importance—such are the *Union Bancaire du Nord*, *Union des Mines*, *Electro-Crédit*, and *Union Financière pour l'Industrie Electrique*.

Some years ago efforts were made by French financial circles to improve credit facilities for French producers by developing the international acceptance market in francs on Paris. For this purpose, the *Banque Français d'Acceptation* was created in 1929, and the *Banque d'Escompte* in 1937, but the business has, however, remained comparatively unimportant, mainly owing to the established supremacy of the London bill market.

Credit Facilities arising from Business Combinations. A very considerable proportion of the credit for industry is now provided through sources other than the banks, through facilities extended by large undertakings to smaller undertakings, which they in some degree control. To an increasing extent industrial concerns form connexions with related activities either vertically or horizontally, e.g. to acquire raw materials, to control wholesale and retail stores, to control the manufacture of components, or to secure an interest in services consuming their products. Thus motor manufacturers often sponsor motor services and repair stations, shipping companies finance shipbuilding yards, and the big stores often have large interests in the makers of the goods which they sell.

Discount System. French banking practice differs from English in the universal use of the discount and rediscounting system now mainly conducted through big banks, bills being drawn for the smallest sums. This recourse to discounting relieves firms to a large degree from the necessity for having much working capital.

Bond Issue System. Another practice enjoying greater vogue in France to secure medium- or long-term credit is the public issue of bonds known as *obligations*. They correspond roughly to debentures, but their market in France is relatively greater owing to the popularity arising from their fixed rate of interest, and to their priority of charge on assets.

Special Credit Institutions in France

A number of special organizations exist to provide credit, because France, in contrast to certain other countries, has relatively few large and prosperous saving banks more or less at liberty to dispose of their funds as seems best; in France such funds are necessarily invested in government securities or lodged in Paris with the *Caisse de Dépôts et Consignations.*

(1) *The Caisse National de Crédit Agricole,* established at the end of the last century, is a central organization operating through ninety-eight regional banks which in turn operate through 6,050 co-operative credit societies, and providing credit, for example, to landholders for the purchase of machinery, or to small rural businesses.

(2) *The Crédit Foncier* is a semi-state mortgage bank, and is regarded as the second French financial institution after the Bank of France. It deals with the issue of municipal, departmental and other public loans, and in the making of advances on property. Its funds are drawn from the issue of loans, and the regulations require that its total loans should not exceed its borrowings, its profits being derived from the lower rate at which it is able to borrow.

(3) *The Crédit National* (1919) deals with compensation to war sufferers. It is also authorized to make loans for colonial development in Algeria, Tunis, Morocco and Syria.

(4) *The Crédit Colonial* (1935) is concerned mainly with the development of colonial enterprises.

(5) *The Crédit Maritime* (1928) provides facilities to shipowners and shipbuilders through the institution by the State of low interest rates for the building of ships.

(6) *The Banque Nationale Française de Commerce Extérieur* (1919) deals especially with the financing of foreign trade.

(7) *The Caisse Centrale de Crédit Hôtelier Commercial et Industriel* (1923) is a co-operative society for the promotion of the tourist industry, while in 1938 its activities were extended to cover the provision of medium-term credit to small traders.

(8) *The Banque Populaire* (1917) is a federation of seventy-eight co-operative credit societies of merchants, manufacturers, and artisans to provide short-term credit for smaller businesses.

(9) *The Crédit Artisanat* (1923) provides loans to craftsmen.

(10) *The Caisse National de Marches d'Etat.* This credit institution was established a few years ago to provide loans at low rates of interest to contractors awaiting payment for their contracts.

Colonial Banks.

There are also established in Paris a number of French banks with no English counterpart, each providing credit facilities in a particular territory of the French Empire. The three principal banks of Algeria, Indo-China and West Africa and the five special colonial banks of

Madagascar, Guadeloupe, Guiana, Martinique and Réunion have the exclusive right to issue notes for their respective territories. These institutions are supervised by the state; several were established by the metropolitan banks. They have served admirably to extend in the colonies the credit facilities of the powerful credit institutions of the whole country.

The Specialized Banks in Paris and the Provinces

A large number of smaller banks provide short-term credit, dealing with special branches of economic activity. Many such banks in Paris specialize in trades like precious metals, woods, building, electricity and cinematograph films. In the provinces such local and regional banks, serving certain industries, have declined in number in recent years, partly owing to long-continued depression in certain industries, partly to amalgamations and to the extension of the activities of the large Paris banks. Their number is still considerable, however, and they are found in many towns, serving important local industries: cotton, wool, jute, coal, sugar, fisheries, in the north; wines and pit-props in the south-west; silks, ribbons, electrical and general engineering, paper and gloves in the Lyons and Grenoble areas; wines in the south; metallurgy, hardware and textiles in the east. The directorates of these local banks contain a larger proportion of industrialists than the joint-stock banks.

Recent developments in Banking Organization

The last 10 years have seen the large Paris banks further strengthen their dominant position through the wide extension of their branches in the provinces and through the absorption or control of certain local and regional banks. The difficult conditions of the past few years have adversely affected some local banks, and the failure of half a dozen local banks of some importance in 1931–2, and of twenty in 1933–4, increased still more the preponderance of the great banks. Several of the leading banks, in recent years, have given their provincial branches a semi-independent status, while in 1929 the *Crédit Industriel et Commercial* joined with other banks to establish the *Union des Banques Régionales*, a step which provided the regional banks with the advantages of a strong Paris connexion and a central organization of their own for business other than short-term, without depriving them of intimate contact with their particular areas.

Altogether the leading French banks have devoted much attention to the maintenance of an adequate connexion with customers outside

Paris. The danger of excessive centralization is the greater in France in that the historical process of the development of the great French banks is the reverse of the English. While the leading English joint-stock banks originated in the provinces and later established themselves in London, thereby retaining a close link with provincial developments, the French banks, with one or two exceptions, of which the most notable is the *Crédit Lyonnais*, started operations in Paris and only later extended to the provinces.

GENERAL ECONOMIC SITUATION

Economic Affairs 1919–39

The outbreak of war in 1939 came at a time when France was making a serious effort to overcome one of her recurring financial and economic crises. More than many countries she had suffered from disturbances to her economic life in the past 20 years. World economic problems left their mark on French prosperity, but not to the same extent as in Great Britain. More important were two sets of factors peculiar to France: certain features of the internal financial, political and social structure, and the enormous effort required to repair the losses incurred in the war of 1914–18. Each succeeding crisis had its roots in the past, so that a summary of French economic affairs of the past 20 years will throw some light on the position in 1939 and on the questions which will have to be faced in the future.

This summary may conveniently be considered in four main periods: (i) the period of strain after the war of 1914–18, lasting from 1919 to 1926; (ii) the period of prosperity ending in 1933; (iii) the period of disturbance, 1933–8, following the impact of the world economic crisis and culminating in the extensive economic and social changes attempted by the Blum (Front Populaire) Government; (iv) the period of reorganization and financial reform, 1938–9, under M. Reynaud, as Finance Minister.

(i) 1919–26: *Recovery after the War of* 1914–18

To meet the cost of the war, borrowing, rather than heavy taxation, had been resorted to on an enormous scale, from the Bank of France and from the public. The unsoundness of this policy was realized, but hardly any other was possible, for the greater part of French taxation revenue was derived from indirect taxation, and it was impossible to find large sums by direct taxation, as in Great Britain. It is arguable, too, that as France suffered a greater economic strain than any of her allies, the government could not increase the burden on the nation.

After the end of the war, in spite of the great reduction of expenditure, borrowing was continued, for the reconstruction of the devastated area had to be carried out quickly and there was a general expectation that eventually the greater part of the German reparations would be paid. In 1921–4, during the post-war depression, France remained comparatively active and suffered less than Great Britain, while by 1926 the country had made a spectacular recovery from the war.

Such a position was not fundamentally sound, however, for it was associated with the piling up of debt, the great inflation of the paper currency—from 5 milliards of francs before the war to 50 milliards in 1926—and the expectation of payment from Germany. With the collapse of the mark and the failure of the French occupation of the Ruhr the franc fell in value, and both Frenchmen and foreigners began to export their capital. It became clear that no more than a fraction of the claims on Germany would ever be met; confidence in the currency evaporated and the collapse of the franc followed. It became quite impossible to balance the budget, and a change of government became necessary.

(ii) 1926–33: *The Period of Prosperity initiated by the Poincaré Government*

As a result of the inflation and collapse of the franc the public lost heavily as investors but gained something as taxpayers, for much of the accumulated debt had been wiped out by the reduction of the currency to one-fifth of its former value. The new government increased taxation, both direct and indirect, created a special fund for the redemption of debt and suppressed unnecessary offices, while the Bank of France provided ample means to protect the exchange. The establishment of a strong government was probably the most salutary effect, for confidence returned to the country and the franc rose to 124 (see pp. 319–20). French capital rapidly returned to the country, the budget showed a surplus, and some progress was made in reducing the debt. In 1928 the franc was stabilized at 124 to the pound, a low value which gave French exporters some advantage in competition with other countries. After the resignation of Poincaré in 1929, however, the fiscal situation again tended to deteriorate.

Following powerful pressure, taxation was reduced by 5 milliards, 1929–30. Expenditure rose, however: government employees received a long-overdue increase of salaries; housing and education demanded expenditure; and in 1930 a long-discussed social insurance scheme was adopted, involving the organization of old-age pensions, health insurance and life assurance. No provision was made for unemployment, as France so far had experienced relatively little unemployment. At this time, too, extensive credits were necessary to permit the modernization of the armed forces and the construction

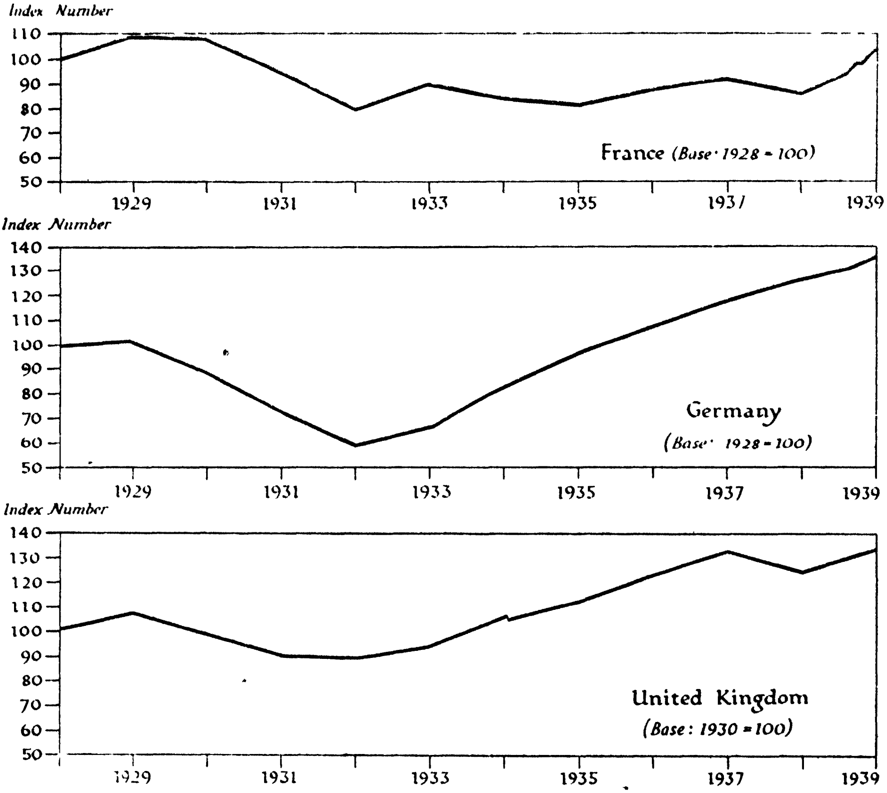


Fig. 101. The trend of industrial production in France, Germany and the United Kingdom, 1928–39

From *Statistical Yearbook of the League of Nations, 1938–9*, pp. 186, 190, 195 (Geneva, 1939).

The graphs show the course of industrial production as a percentage of production in the base year. Although the graphs cannot be compared in detail, as the methods of calculating index numbers in the three countries are not identical, they permit broad comparisons to be made, and show how industrial production in France failed to effect, after 1933, a recovery comparable to the recovery shown by industry in Germany and in the United Kingdom. The break in the graph for the United Kingdom reflects a slight adjustment owing to a recalculation of the base.

of the Maginot Line, which had been commenced in 1928. Thus the budget was burdened increasingly at a time when, owing to the prevailing world depression, the yield of indirect taxation declined. For several years a compromise between resort to further loans and increase of taxation was followed in a piecemeal manner. The Stavisky scandals came as an unpleasant shock to public opinion (see vol. II, chapter III).

(iii) 1933–8: *The Period of Disturbance*

The economic situation worsened and unemployment grew until by 1935 it reached maximum proportions. French costs were now high in terms of many foreign currencies; strikes in factories increased. In 1936 came a change of government, when the Front Populaire, or coalition of left-wing parties, came into power under the leadership of M. Léon Blum. The new government set out upon a programme of reforms of a drastic character for France. They were designed to bring about great improvements in the standard of living of many sections of the wage-earning and small-salaried classes, and at the same time to give industry a larger home market. By increasing wages and shortening hours the policy set out to expand purchasing power, assuming that the large increase in consumption would permit a large increase in output and thus allow increased wage costs to be offset by mass-production methods. In addition, an easy money programme was followed, a public works programme set up, and the currency devalued to help exports. From the resulting increase in the national income the government hoped to draw a substantially increased revenue and thus eventually to effect a balanced budget.

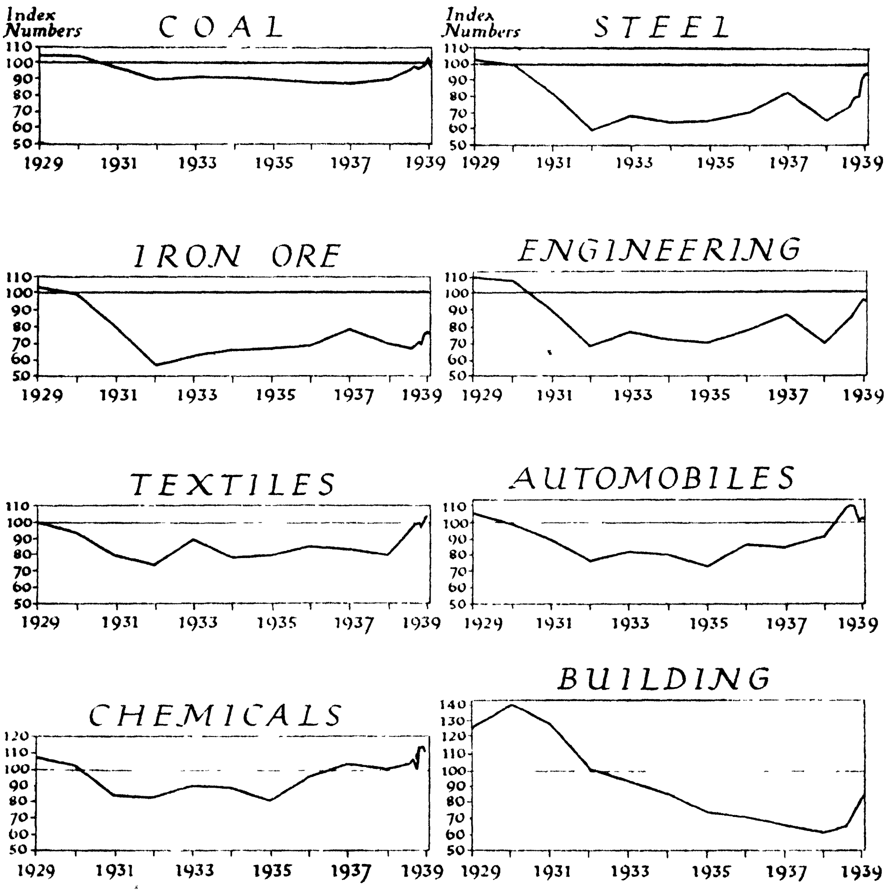
The principal items of reform comprised widespread wage increases, up to 20%, the establishment of a 40 hr. week, and a compulsory annual holiday of 15 days, for 12 days of which full wages were to be paid, together with improvements in the status of labour. The establishment of a national unemployment insurance scheme was planned, but not put into effect. Many of the reforms were long overdue, and have come to stay, if in a modified form, while the theory by which the national economic structure was to bear the cost of the scheme was not unreasonable. A variety of factors, however, combined to render the success of the legislation impossible, and to discredit the plan more, perhaps, than it deserved. In the first place, the international situation in 1936–7 was hardly favourable for far-reaching experiments affecting French productive capacity. In the second place, the reforms were introduced much too rapidly, imposing a sudden strain. There is little doubt that French industry was ill able to bear the simultaneous wage increases, shortening of hours, and imposition of paid holidays. Many industries had to increase their staff, e.g. the railway systems by 80,000 and the public services by 50,000. The coal and iron mines increased their labour force by 12–15 % without approaching the previous figure of output, and were therefore unable to secure the old level of receipts save by raising their prices by about 40 %; in the first quarter of 1937 imports were 7·6 million tons, 45 % greater than in the corresponding quarter of 1936. The carrying capacity of the inland waterways was reduced, for barges took longer to cover journeys.

The economic situation of the country was unable to adapt itself to the new conditions or react in the way which was necessary for the success of the experiment. The wage increases were overtaken by a rise in prices. The wage-earning classes did not spend as much on consumption goods as they were expected to (perhaps not as much as the wage earners of other countries would have spent). The increase of purchasing power went mainly to the organized workers, and thus the total purchasing power, in a largely agricultural country, was not greatly extended. A number of factories had to close owing to increases in the cost of coal and labour, so that unemployment was not appreciably reduced, in spite of the large numbers of men serving in the army and the departure of 400,000 foreign workers (see p. 335). Any increase in production was far below the volume required to achieve the object of the framers of the plan, and was accounted for mainly by the rearmament programme, the Exhibition of 1937, and other programmes of a public works character, which were sources of expenditure rather than of revenue to the government. The industrial activity of the country therefore was unable to impart any buoyancy to the national finances. Anxiety continued over the budget, for the government, like its predecessors, was living at the rate of about twice its taxation revenue, and was obliged to resort to further expedients to keep its treasury afloat. The slowing up of production, anxiety over the budget, and fear in the minds of many over the events in the world of labour, gave fresh acceleration to the spending of capital, to its hoarding or to its export, at a time when France itself needed fresh capital funds.

In short, the period of the Popular Front government may be regarded as a period of experiment and of an unsuccessful search for a cure for economic ills. Unfortunately, the next year or two saw disturbed conditions in Europe, which made it still more difficult for French economy to recover its buoyancy.

(iv) 1938–9: *The Period of Reorganization*

In the first three months of 1938 three successive cabinet changes occurred, and in April the Daladier Government was established. It



Base · 1928 = 100

Fig. 102. The course of production in leading French industries, 1929–39

From *Statistical Yearbook of the League of Nations*, *1938–9*, p. 190 (Geneva, 1939).

attempted to restore confidence and to amend the effects of the recent legislation. From April to September a number of steps were taken —the progressive increase in the length of the working week and in the number of longer weeks worked in factories, some redressment of the budget, and a lowering of interest rates. In May the franc was devalued (making the third devaluation of the franc), and pegged at 179 to the pound sterling. While hardly drastic reforms, these steps encouraged a revival of confidence and hence capital flowed back to France, and the government was able to secure subscriptions to a 30-year 5% loan of 5,000,000,000 francs. Following the Munich crisis the nation showed a tendency to unite behind the government. In November 1938, M. Reynaud joined Daladier and became Finance Minister. The new government pledged itself to 'return France to work', stabilize the franc and institute economy in government expenditure. Legislation was enacted to reduce the frequency of industrial strikes, which had been such a serious feature in the French situation, by the imposition of a system of arbitrators and super-arbitrators. This programme was by no means immediately effective. In November came a law to establish a 44 hr. 6-day week, and to permit overtime while limiting the amount of extra pay received for it. Protest against this legislation took the form of the general strike of 30 November 1938. Drastic action by the government quickly broke the strike, however, and thereafter strikes became very infrequent. The effect of the new labour legislation and of the improved industrial outlook is illustrated by the fact that, while in 1937 over 300,000 workers had been on strike at one time or another, and in 1938 nearly 400,000, in 1939 practically no strikes were reported. Further, there was a progressive increase in the number of hours worked:

Percentage of French Labour occupied per week

	Less than 40 hr. %	40 hr. %	More than 40 hr. %
1938 monthly average	18·3	77·7	4·1
January 1939	13·0	68·8	18·2
February 1939	11·1	65·4	23·5
March 1939	10·5	67·5	22·0
April 1939	8·6	64·3	27·1
May 1939	8·6	56·6	34·8
June 1939	7·5	53·3	39·2
July 1939	6·9	49·8	43·3

In spite of the lengthening of hours of workmen employed in France during 1939, and in spite of the elimination of strikes during the year, industrial improvement in France was such that unemployment decreased rapidly throughout the first 8 months of the year.

Fiscal and Monetary Reforms

On 12 November 1938, M. Reynaud, Minister for Finance, published an analysis of the economic position of France. Its clarity and clear-sightedness created a very favourable impression. He proceeded to apply a programme of more liberal credit, economical administration of public revenues, budgetary reform, encouragement to capital to seek investment in France, and a labour policy calculated to soften the rigours of recent labour legislation—all these formed part of a 3-year programme. By May 1939, M. Reynaud was able to report that considerable improvement had taken place, and the plan seemed well set to continue. Features of the changed position were: (i) the return of large sums of gold which had been in flight to foreign countries, and the release of hoarded gold; (ii) an end of franc speculation; (iii) the greater ease by which the treasury was able to meet its needs; (iv) the considerable increase in savings deposits; (v) the fall in interest rates; and (vi) the rise in stock-market quotations—fixed interest securities by 9·83%, others by 11·22%. Industrial activity increased and unemployment declined; the amount of coal mined rose and imports diminished. Industrial exports increased, thus reducing the adverse balance of trade. The extent of the recovery of business can be seen by the following indices of activity:

	October 1938	March 1939
Production index	81	92
Textile index	82	95
Metallurgical index	66	81
Steel production	541,000 tons	668,000 tons

Automobile sales rose from 50,000 vehicles in the first quarter of 1938 to 61,400 in the first quarter of 1939. Owing to this revival of business, receipts from indirect taxation were able to increase. Wages, enlarged by overtime working, were able to rise faster than prices rose.

Later on, steps were taken to enable French industry to adjust itself to war preparation. The government arranged to control the direction of workers into industry. In order to prevent any undue increase in consumption, overtime rates were not to apply up to 45 hr. weekly, although steps were taken to prevent too sudden a reduction in the prosperity of the consumption goods industries. To avoid the danger of inflation which might follow from a heavy increase in government expenditure, money was to be diverted into the exchequer by a special armaments tax of 1 %, by control of profits in industries working on war orders, and by the abolition of the wheat and meat subsidies.

In short, the period begun in April 1938 with the establishment of the Daladier Government, to be followed in November by the appointment of M. Reynaud as Minister of Finance, marked the initial phase of a new French economic policy. The errors and uncertainties of the Popular Front regime were progressively eliminated, and experimental methods of relieving economic ills were abandoned for more orthodox methods. These methods, however, involved a more rigorous fiscal policy, a more enlightened financial programme, and a more clear-sighted approach than those of the governments which had preceded the Blum regime. The outbreak of war cut short the new stage in French economic policy.

UNEMPLOYMENT

It is not possible to adduce statistics of unemployment as a commentary on the state of prosperity in France, nor is it possible to make comparisons between the numbers stated as unemployed in France and in other countries. As there is no national system of unemployment relief in France, the official returns of unemployment do not cover, as in the United Kingdom, the vast majority of people unemployed, at any given time, but refer only to those receiving relief funds. In 1939, funds embraced only 21,000,000 inhabitants of all ages, or slightly more than half of the total population of the country.

The monthly index, which dates since 1931, fails to provide a true picture of the volume of employment or of short-time working, for the occupied population (excluding fisheries, agriculture and forests, and the public services) is over 10·5 millions, whilst only about 2·4 millions are actually covered by the index, the remainder working in establishments of under 100 persons not being brought into the account.

A second factor which makes it difficult to estimate the incidence of unemployment in France is the fact that many foreign workmen returned to their native countries when they became unemployed, either from choice or because they lost their permits to work in France. Statistics are not available to show the extent of this movement, but clearly it complicates the value of published returns of unemployment. Some French authorities regarded the liability of unemployed foreign workmen to return home as an asset to France, in that it had, to some extent, a 'cushioning' effect upon unemployment in France.

The relative incompleteness of the French returns is illustrated clearly enough by the fact that in the quinquennial censuses a much larger number of people declare themselves as unemployed than appear as receiving relief funds:

	No. stated as unemployed in the census	No. stated as receiving relief
1926	243,000	661
1931	453,000	48,500
1936 (March)	823,803	465,100

The returns of unemployed people drawing relief are given below, for what they are worth:

	No. in receipt of benefit	No. of applications for work
Average 1930	(2,514)	13,859
1931	(56,112)	75,215
1932	273,412	308,096
1933	276,033	307,844
1934	345,033	376,320
1935	426,931	465,875
1936	431,897	475,272
1937	350,330	379,095
1938	375,742	408,024
January 1939	415,987	460,816
February	414,756	457,760
March	400,075	441,194
April	386,158	425,072
May	375,522	408,533
June	349,000	—
July	320,300	—
August	302,400	—

It is difficult to say whether the much larger figures given in the census represent the true incidence of unemployment, for they may include numbers of people not commonly understood as unemployed.

Regional Distribution

The manufacturing areas contain the vast majority of those unemployed, as might be expected. The proportion of unemployment in the Paris area (Seine, Seine-et-Oise departments) was particularly high, and in fact represents almost half of the total recorded for the whole country: in 1936, Paris had 205,550 unemployed out of 432,500 (i.e. of the number drawing relief) in the whole of France; in 1937, 171,500 out of 350,000 and in the first quarter of 1938, 206,000 out of 412,000. It should, however, be remembered that these figures relate to persons in receipt of unemployment relief, and unemployed relief funds are more likely to be organized in industrial areas.

Proportion by Age

Figures regarding age are not given in unemployment statistics, but the problem of the older workers is clearly as acute in France as in other industrial countries. At St Etienne in 1936, out of 2,637 registered unemployed, 43 % were more than 50 years of age, and, of these 27 % over 60. In the department of Ardennes, nearly a third of those unemployed were over 60; in 1938 in the Paris area, out of 215,000 unemployed, 24 % were over 60, and 46 % over 50 years of age; in some communes and occupational groups the proportion was even higher. Over the whole country, it is probably true that one in every five unemployed was over 55. A comparative table of the ages of workers and unemployed, prepared in 1937 by a Paris newspaper, showed, in fact, that from the age of 35 onwards the proportion unemployed tended to exceed the proportion employed, and, particularly so between the ages of 35 and 60.

The Organization of Unemployment Relief

In France unemployment relief is organized by (*a*) communes, municipalities and departments through 'fonds de chomage', and (*b*) by local unofficial bodies of somewhat similar character to the mutual aid societies and trade benevolent associations found in England. Local authorities are not compelled to establish such funds and, in fact, their number is very limited. Attempts have been made in the past to transfer the entire responsibility for the maintenance of the unemployed to the state, but without success, although at the end of 1937 the government declared its intention to effect this. The National Unemployment Fund constituted in 1936 was concerned only with the subsidies to departmental and local authority funds. Unless, therefore, a worker who became unemployed was a member of an association or lived in an area in which the local authorities had constituted a relief fund, there was no source from which he could derive assistance.

(*a*) *Official Funds.* Official funds were administered by a local authority or group of local authorities, or by a department. All towns of over 50,000 inhabitants had such a fund, or were affiliated to one, as were the majority of towns with over 15,000 inhabitants, but the vast bulk of the remaining communes had made no such provision. Most of these communes are agricultural in character, where those who fall out of employment in trade and industry could usually find work in agricultural pursuits. There were, in May 1939, 1,685 such funds, covering 4,984 communes with a population of 21·3 millions; of these, however, only 951, covering 2,785 communes with a population of 17·5 millions, were active (the number of communes in France is 38,004 and the total population is 41,900,000).

(*b*) *Unofficial Funds.* The unofficial organizations which exist for the relief of unemployed persons are supported mainly by members' subscriptions, but are entitled in certain circumstances to a subsidy from the state. The latest return available (for 1936) shows that, in the second half of the year, there were 364 occupational funds, of which 198 were working and of which 175 received subsidies from the state; these funds had a membership of 957,704 and paid benefits to 32,027 of their members, amounting in all to 6,929,663 francs; they received as subsidies 3,196,064 francs.

The regulations as to the scale of relief were codified in 1939, when maximum receipts from public funds were prescribed as follows: fr. 9 per day for the head of the family; fr. 4·50 for husband—or wife—who is not employed; fr. 4 per day for children under 14 who are not working and are registered in an unemployment bureau, are following a course of professional instruction, or are apprenticed and earning a daily wage of less than fr. 6; and fr. 4·50 for all other dependents of over 25 who are not working. The maximum payment ranged from fr. 20·50 a day for a family with not more than two children to fr. 29 for a family with five or more children under 16; it was specified that the maximum payable to a family should not exceed half the normal wages, excluding family allowances, earned by the family.

The maxima fixed in respect of unofficial funds were: fr. 9 for the head of the family and each member of the family adhering to the fund, and fr. 4·50 for all dependent members with an overriding maximum of fr. 29. These payments took no account of benefits paid to members of the family who were themselves members of the fund. The total payment to a worker, drawing money from both official and unofficial funds, was limited to two-thirds of normal wages, including family allowances. A means test was to be applied after a worker had been unemployed more than 180 days in any 12 months.

State Subsidies

To these funds administered by departmental local authorities, the state contributed (within the limits of the maxima prescribed regarding payments to individuals) from 60 to 90 % of the total sums distributed, according to the proportion borne by the numbers of recipients of relief to the population of the area. Grants to unofficial funds were paid on a calculation based upon the number of days of unemployment among members of the fund in proportion to the number of possible working days; when these were not more than 20 %, the state paid a subsidy of 60 %, and above 60 %, 90 %.

The sums distributed by official funds in 1935 and 1936 were 1,618·5 and 1,967 million francs respectively, of which the state share was 1,033 millions and 1,199 millions; for the first 6 months of 1937, the total payments were 820 millions, of which the state contributed 532 millions. For 1935 and 1936, the unofficial funds paid out respectively 15·1 and 15·6 millions, of which the state supplied 6·3 and 7·3 millions.

State Schemes of Public Works for Unemployed Relief

Like other countries affected by severe unemployment, France undertook extensive public works as a means of relieving unemployment. Several schemes of national equipment were planned in outline during 1932 and 1933, and a comprehensive scheme, known as the Marquet Plan, was adopted in 1934, providing for large public works expenditure to be financed by loans, and expected to give work to 100,000 unemployed. These relief schemes, amounting to 5,620 millions, were to be carried out by the railways, departments and local authorities with the aid of loans from the Social Insurance Fund but without other assistance from the state. A further 4,380 millions were to be spent on works subsidized by the state. The total amount of pledged expenditure was estimated at 1,700 millions at the end of June 1935, when the number of workers engaged was estimated at 60,000. Further allocations were made and the plan was revised to give special favour to schemes in regions of severe unemployment. The new scheme envisaged expenditure of the order of 3 milliards in 1936 and 1937, and of 1·5 milliards in 1938.

The Blum ministry of 1936, however, drew up a fresh plan of public works, which was to go far beyond the Marquet Plan. It involved the expenditure of 20 milliards of francs over 1936–9 on work carried out by the government, whilst other improvements were to be carried out for departments and local authorities, being subsidized by the state to the extent of approximately 3 milliards. Of the expenditure involved by the new plan, a preliminary credit of 4,000 millions was to be used to liquidate the remaining work in course of execution at the beginning of 1936 under the Marquet Plan. The remainder was destined to improve not merely the agricultural and economic equipment of the country, but also national defence, hygiene, science, education, sports and tourism.

The programme of public works was heavily cut down by the decree-law of 12 November 1938, as part of the new Finance Minister's attempt to restore the financial position. Altogether, since 1931, a total state expenditure of 21,645 millions had been authorized in connexion with public works, and the total expenditure by the state and public authorities was put at 35,000 millions. The new decree forbade any new engagement and cancelled existing contracts on which no work had been done.

Vocational Training of Unemployed Workers

The retraining of the unemployed received attention in France, but it was only recently that adequate funds were provided. Certain training centres had functioned since 1935, when sums were allocated from the National Defence Budget; their purpose was, however, rather to provide skilled labour in those areas to which certain defence industries had been transferred, following the policy of decentralizing certain industries. Eight such centres were in existence by the middle of 1937: those at Beaugency, Châteaudun (two), Clermont-Ferrand and Châteauroux were run by employers, with the aid of a subsidy, those at Nantes and Bordeaux were run by employers' associations, and the centre at Limoges was run by the Chamber of Commerce. Two others were later organized at Albert and at Clichy (Paris).

A decree-law of 1938 provided a sum of 10 millions for the creation of state-aided centres, and the 1939 budget allowed a further 15 millions for subsidies. Further training centres were accordingly opened, and in April 1939 twenty centres were in operation, capable of training 4,000 workers a year. Certain measures were also taken to facilitate the transfer of workers from one area to another or back to agriculture.

Shortage of Skilled Labour

Despite the high unemployment figures recorded since 1932, there has been a continuous shortage of skilled labour in France, particularly in the engineering industries. In 1919, some provision had been made for the vocational training of young workers so as to avoid a recurrence of the shortage of skilled labour, felt so severely during the war of 1914–18, but, in the post-war boom years, these measures gradually failed to be applied, as a demand for semi-skilled labour grew continuously with extension of mass production. At the beginning of 1936, the industries working for national defence occupied 100,000 engineering workers of whom 50,000 should have been skilled, but there was in fact a shortage, amounting to 5,000 men for example, in the cold working of metals alone. The problem became more acute with the introduction of the 40 hr. week, which increased immediately the numbers required; in national defence industries alone the shortage amounted to 15,000 by the end of 1936. Furthermore, the railways were compelled to take on a large extra staff, and many skilled workers were attracted to the railways.

ECONOMIC CONDITIONS UNDER THE VICHY REGIME

(See also pp. 143–152, 245–255)

The economic life of France under the Vichy regime presents three main features: (i) the great decline of overseas commerce, (ii) collaboration with Germany, and the penetration of French industry by German capital, and (iii) the attempt by the Vichy government to maintain intact the financial structure of the country.

Decline of Overseas Commerce

It is clear that the foreign commerce of the country was bound to suffer a radical change. It has been estimated that, after making allowance for price movements, the volume of foreign trade in 1941 was only one-fifth of the volume in 1938, and as a result the colonies now occupy a dominant place in extra-European trade. By the terms of Article II of the armistice, French merchant shipping was placed under Axis control; but its movements were not, in fact, much interfered with, provided that it was engaged on services essential to France; in some of these, notably in the shipments of oilseeds and rubber, Germany was herself interested. A certain measure of trade with the colonies, more especially with North Africa, was soon re-established. From North Africa came shipments of grain in the spring of 1941—some 200,000 tons or more—which served to tide over the period before the harvest in metropolitan France: while large shipments of fruit and vegetables, larger indeed than in peace-time, helped to relieve the food situation in France. From West Africa, imports of ground-nuts (of which a minimum of 25 % was taken by Germany) were essential in maintaining the fat ration in France, while in the first 12 months after the armistice there were not inconsiderable shipments of rubber and rice from Indo-China, and of hides, coffee, canned meat, etc. from Madagascar. After the summer of 1941, however, communications between France and these territories virtually ceased. Commercial relations between France and her overseas possessions, throughout this period, became rather one-sided. A certain amount of machinery, manufactured goods, pharmaceutical products, etc. were shipped to the colonies during the first few months after the defeat of France, but such shipments later dwindled almost to nothing. Indeed, in North Africa, the shortage of consumption goods, especially textiles, owing to the decline in French imports, led to a great deal of unrest.

Apart from exchanges with Germany, a certain amount of commercial intercourse with the rest of Europe has been maintained. Chemical, pharmaceutical and optical goods, wines and perfumery have been exported to Spain, Portugal, Sweden, and the Balkan countries. The main imports into France from Spain and Portugal have been fruit and vegetables: from Sweden, cellulose, newsprint, etc.; and from the Balkans, foodstuffs and agricultural products such as pork and poultry, dried vegetables, etc. The only other country with which France has managed to carry on moderately unrestricted trade is Switzerland, though this is now diminishing. In 1941 there was a debit balance of 136 million francs: French imports from Switzerland consisted of cattle, cheese, dried fruit, wood pulp, etc., amounting to 649 million francs; exports of wine, chemical products, metals, silk, etc. amounted to 513 million francs.

Collaboration with Germany

Economic relations with Germany opened with wholesale appropriation both of goods and machinery (see p. 247). Many thousands of tons of metals, timber, wool and cotton passed into German hands within a few months of the armistice. When, however, it became clear that the war was likely to be prolonged the policy of collaboration was rapidly developed. The *Wirü* organization (see p. 247) offered a foundation for collaboration, while a further step was taken with the establishment of a Central Contracts Office, *Zentraluftragstelle* (*Zast*), to handle the sub-contracts which German manufacturers were more and more passing on to French manufacturers. With the strict rationing of commodities, coupons authorizing the supply of raw materials came into use. They are known as *Monnaie matière*, and are issued by *Zast* to French manufacturers. Payment for work done is effected through two clearing offices in Berlin and Paris.

Certain raw materials for French industry are supplied by Germany, notably material for the rubber industry. Raw materials of which France has a surplus, such as aluminium, bauxite and leather, go to Germany. The position is, however, continually affected by the integration of industry in the two countries, and exchanges of commodities are subordinated to raw material allocations which are granted when contracts to manufacturers have been arranged. In foodstuffs, both French-produced surpluses and a proportion of colonial imports are directed to Germany.

From about the end of 1941, however, difficulties began to arise over the provision of raw materials, and the dwindling of stocks put a limit to the revival of French economy. Difficulties in the supply of coal and hydro-electric power, together with shortages of steel and exhaustion of stocks of non-ferrous metals, caused a decline of French production in many fields. As a result, the Germans have reduced the proportion of the French output which is available for French consumption. It is against this background that the Germans have developed an increasing interest in the transference of French man-power to German factories. It was hoped to utilize unemployment as a lever to force workmen to move, for many non-essential manufactures were stopped, and shortage of materials led to an increasing amount of short-time working. For the important fortification, harbour and landing field construction along the North Sea, Channel, and Atlantic coasts, labour markets are disorganized by over-bidding for workmen by the occupation authorities. The significance of powers given late in 1941 to Lehideux for industrial planning and for the compulsory closing of factories now seems clear; they were doubtless intended, in some measure, to create unemployment in order to assist the mobilization of labour for the execution of German orders, or for transfer to replace the depleted staffs of German factories. The gradual closing of factories is reported (see p. 249), associated with concentration on work for German needs. Transport difficulties, together with the hope of greater immunity from bombing in eastern Germany, are possibly additional factors in the apparent growing German anxiety to hasten this transference of man-power. At any rate, the mobilization of French labour has been intensified, and has been accompanied by a greater degree of indirect compulsion; the numbers of French workers now employed in Germany have risen to 140,000 including 30,000 women, and in the autumn of 1942 a demand for an additional 150,000 was made. Metal workers, motor mechanics, shipbuilding specialists, as well as railwaymen and motor-vehicle drivers, are particularly in demand. Arrangements for the removal of entire firms, however, have not reached any advanced stage, although evidence suggests that this practice is likely to develop as a result of the growing damage by air raids to French industrial plants.

German Control of certain French Industries

An important aspect of the subordination of French economic life to German interest is the participation of German capital in French firms. This phase has been most marked in the chemical and textile interests. The widespread *Kuhlmann* chemical combine has been taken over by a newly constituted Franco-German concern called *Francolor*, 51 % of the share capital being German. Two other chemical companies, *Rhône-Poulenc* and *Air Liquide*, also enjoy close relations with German interests. As a result these three companies in 1941 all showed an increase of earnings over those for 1939. The other great chemical combine in France, *St Gobain*, has participated less closely, and has not shared in the prosperity. A similar position exists with the electro-chemical concerns of *Péchiney* and *Ugine*, which between them control the entire aluminium output of France. In the field of textiles, the artificial silk industry has been unified in a new concern, *France-Rayonne*, in which the German *Zellwolle und Kunst Seidering* participates to the extent of 30%.

Penetration by German capital takes place mainly by the formation of subsidiary companies or by the acquisition of shares in subsidiary companies. This development has caused considerable apprehension in France, and the government took what steps it could to limit the extension of German financial control over industry. In October 1940 it issued a decree preventing the sale of French shares and holding interests to non-residents in France. So far, reports of this penetration seem to have been exaggerated, and apart from the important instances cited above, German participation seems confined to certain film companies and a few smaller firms. It is possible, however, for such transactions to be effected on French and foreign stock exchanges without the cognizance of the French authorities, and German control of French industry may be more extensive than appears on the surface. A parallel feature has been the purchase by

German capitalists of certain French foreign investments: thus the French shares in the Skoda works have passed into German ownership, and Schneider-Creusot has relinquished its holding in the Prague Berg- und Hüttenwerke A.G.

The Financial Position in France

Since the armistice the Vichy government has attempted to secure some measure of continuity in financial affairs, in face of the many exceptional factors which exercise a disturbing influence. To the changes consequent upon the outbreak of war in 1939 were suddenly added in the summer of 1940 all the results of defeat. Nevertheless, much of the existing machinery of economic and financial life remains.

As 1940 passed into 1941, changes in habits of saving and investment were noted. Lack of confidence in private finance was exhibited by many, for there was a growing disinclination to use cheques, which called forth government attempts to reassure the public. On the other hand, stocks and shares became the object of lively speculation by people with money to invest. Some shares even, during 1941, rose in value by 100%. Shares in electricity and chemical enterprises were especially sought after, but later there were also substantial advances in metallurgical and coal-mining shares, even in those of companies operating in the forbidden zone. In order to stop speculation and to prevent the reckless investment of small savings, the government imposed, in February 1941, a series of taxes on business profits. Except for artisan undertakings, business concerns in which profits exceeded the average annual amount during the two years before the war were subjected to a business tax varying between 20 and 80%, according to the rate of profit.

Investment and saving in France have continued, partly owing to the cessation of openings in peace-time business. Savings by small investors have increased, and in the first quarter of 1942 the excess of savings bank deposits over withdrawals reached the record figure of 2,500 million francs. The savings banks have attracted capital, particularly in rural areas. Ordinary bank deposits have increased still more. The commercial banks have had to change many of their normal fields of activity. Since the occupation there has been a sharpening of competition for what business there is: thus the Marseilles banks have taken away from the banks of Nice the financing of the olive crop and of olive oil imports.

The Budget. In the budget for 1941, revenue was estimated at 68 milliard francs and expenditure at 134 milliards, the gap being met largely by public subscriptions to government loans. The position is regarded as not unsound by the Vichy government, for interest rates have fallen. The estimated revenue was slightly higher than the revenue for 1939, the last year of peace. The expenditure of 134 milliards comprised 97 milliards for the ordinary budget, and 37 milliards for the extraordinary budget, which is devoted largely to special demands resulting from the war, such as the relief of prisoners, the disabled, and refugees.

The cost of the German occupation, which the government has to meet, is not included in the budget. This cost amounts to nearly 400 million francs per day (an amount almost equal to the budget expenditure of the country). The occupation costs are met by advances to the government from the Bank of France.

The State and Economic Affairs. State interest in economic and financial matters has inevitably increased. On the one hand, the state has acquired more control of the Bank of France, the *Crédit Foncier* and the *Crédit National*, and has secured more power on the boards of companies like the *Compagnie Générale Transatlantique.* On the other hand, it has attempted to develop a greater degree of economic decentralization on regional lines. In March 1942, regional Economic Chambers of Commerce were established, based upon the 165 Chambers of Commerce and the administrative regions of the Vichy regime. The function of these new bodies is to advise the government on industrial and commercial matters and to administer public services, operate ports and handle government contracts (see Appendix I, vol. II of this Handbook).

BIBLIOGRAPHICAL NOTE

1. The authoritative collection of statistics on French trade is the two works published by the Statistique Générale: (*a*) *Tableau Général du Commerce Extérieur, 1938* (Paris, 1939), which deals with trade by countries and by commodities, both by weight and value; (*b*) *Tableau Général de la Navigation Maritime, 1937* (Paris, 1938), which deals with the mercantile marine and with the movement of shipping and cargoes at ports. A convenient summary of many of the tables in these works will be found in *Statistique Annuaire, 1938* (Paris, 1939).

2. In addition to unpublished English official material there is Sir R. Cahill's *Economic Conditions in France, 1934* (Department of Overseas Trade, 1935), which provides an extremely useful account both of financial and commercial affairs and of the more permanent features of French economic life.

3. The following publications of the United States Department of Commerce provide short but concise accounts: *Economic Review of Foreign Countries, 1937* (Washington, 1938); *Economic Review of Foreign Countries, 1938* (Washington, 1939); *Foreign Commerce Yearbook, 1938* (Washington, 1939).

4. The League of Nations, Economic Section, *Statistical Yearbook, 1938–9* (Geneva, 1939), contains a wealth of statistical material.

5. The following books and articles provide useful accounts of various aspects of French commerce and finance:

F. A. Haight, *French Import Quotas* (London, 1935).

F. A. Haight, *A History of French Commercial Policies* (New York, 1941).

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Ed. by C. Rist and G. Pirou, 'De la France d'Avant Guerre à la France d'aujourd' hui', *Revue d'Economie Politique*, vol. LIII, pp. i–xxiv, 1–593 (Paris 1939).

6. In Tables 1–4 (pp. 348–71 of this Handbook) the statistics have been extracted from the following pages of *Tableau Général du Commerce Extérieur, 1938* (Paris, 1939), as follows:

Table 1. *Foreign Trade Relations*, 51–5.

Table 2. *Imports:*
  Coal, petroleum, etc., 215–29.
  Textile materials, 162, 200–1.
  Oilseeds and vegetable oils, 181–2, 189–91.
  Metals and ores, 215–29.
  Non-metallic minerals, 215–29, 255.
  Chemicals, 230–43, 255.
  Cereals, fruit, 173–6, 177.
  Tropical produce, 184–9, 195.
  Machinery, 319–36.

Table 3. *Exports:*
  Wool, etc., 392–3, 420.
  Iron ore, iron and steel, 438–42.
  Textile machinery, 520.
  Iron and steel tubes, 535–6.

Table 4. *Detailed Statement of Trade with Certain Countries*: 73–129 *passim*.

Table 1. *French Trade Relations, by Value (in millions of francs)*

Rank in imports and exports together	Imports and exports together		Imports		Rank as supplier of imports	Exports		Rank as receiver of exports
	1937	1938	1937	1938	1938	1937	1938	1938
Industrial countries of north-west Europe								
2 Belgium	6,205·6	7,340·8	3,059 6	3,159·5	4	3,146·0	4,181·3	1
4 Great Britain and Northern Ireland	6,142·0	6,855·3	3,389 3	3,239·1	3	2,752·7	3,616·2	3
5 Germany	4,663·6	5,004·2	3,248·6	3,153·2	5	1,415·0	1,851·0	5
6 Switzerland	2,259·6	2,923·9	813 8	994·2	11	1,445·8	1,929·7	4
9 Netherlands	1,887·6	2,532·1	1,056 3	1,187·0	10	831·3	1,345·1	7
23 Czechoslovakia	829·3	706·5	408 1	300 0	32	421·2	406·5	15
45 Austria	393·5	259·7	243 8	136 8	45	149·7	122·9	37
Scandinavian and Baltic countries								
15 Sweden	1,176·0	1,144·8	821·8	650·7	17	354·2	491·1	13
20 Poland	587·9	802·1	400·2	445·7	23	187·7	356·4	18
28 Norway	490·9	546·8	305·6	310·6	31	185·3	236·2	22
37 Finland	548·5	406·0	450·3	284·3	34	98·2	122·0	38
44 Denmark	199·4	267·8	91·3	98·4	51	108·3	169·4	27
56 Lithuania	111·1	88·2	49·4	43·1	58	61·7	45·1	51
59 Latvia	47·9	66·2	29·2	44·6	57	18·7	21·6	61
60 Estonia	57·2	60 1	41·0	32·9	59	16·2	27·2	59
Southern Europe								
17 Italy	1,202 8	1,063·0	571·3	577·9	20	631·5	485·1	14
25 Spain	740 0	581·3	315·0	191·9	41	425·0	389·4	16
29 Portugal	367·4	489·0	234·0	265·6	36	133·4	223·4	23
66 Canaries and Spanish Morocco	4·8	2·3	2·4	0·1	66	2·4	2·2	66
27 Romania	608·9	562·5	397·0	215·4	39	211·9	347·1	19
46 Yugoslavia	167·6	227·1	97·2	102·9	49	70·4	124·2	36
49 Hungary	124·1	161·7	96·2	116·9	48	27·8	44·8	52
51 Greece	128·7	159·5	65·0	75·3	54	63·7	84·2	43
57 Bulgaria	55·3	84·3	26·5	22·2	61	28·8	62·1	47

French Colonies

1	Algeria	7,097·0	8,643·5	3,807·3	4,864·0	2	3,289·7	3,779·5	2
7	Indo-China	2,391·0	2,819·5	1,651·8	1,890·6	6	739·2	928·9	9
8	French Equatorial and West Africa	2,270·3	2,604·7	1,658·5	1,752·6	8	611·8	852·1	10
11	Tunisia	1,540·3	1,859·0	741·4	878·5	13	798·6	980·5	8
13	Morocco	1,135·0	1,567·7	651·2	857·8	14	483·8	709·9	12
16	Madagascar	808·6	1,067·9	517·3	680·3	16	291·3	387·6	17
31	Martinique	390·5	473·4	266·0	337·1	28	124·5	136·3	31
33	Guadeloupe	419·8	468·2	313·4	338·5	27	106·4	129·7	35
38	Réunion	332·6	405·7	246·8	297·5	33	85·8	108·2	40
39	Togoland and Cameroons	300·1	372·3	266·4	315·2	30	33·7	57·1	48
41	Syria	204·1	289·3	89·7	121·9	47	114·4	167·4	28
48	French Oceania	160·9	213·5	125·1	139·3	44	35·3	74·2	45
62	French Guiana	37·7	37·6	11·3	7·6	62	26·4	30·0	57
63	French Somaliland	29·6	35·9	1·7	2·5	64	27·9	33·4	13
64	French India	5·9	18·7	0·9	7·4	63	26·4	30·0	57
65	St Pierre and Miquelon	3·0	5·0	0·4	0·5	65	2·6	4·5	65
3	U.S.A.	5,568·7	6,690·1	4,033·2	5,277·3	1	1,535·5	1,682·8	6

Central and South America

12	Argentina	1,476·7	1,665·7	942·3	936·3	12	534·4	729·4	11
18	Brazil	794·1	1,033·6	604·9	734·0	15	189·2	299·6	21
30	Chile	410·5	480·2	363·5	425·4	24	47·0	54·8	49
35	Venezuela	381·7	443·0	310·9	326·9	29	70·8	116·1	39
40	Peru	243·0	292·8	209·5	251·1	37	33·5	41·7	53
42	Mexico	274·7	286·7	151·1	151·3	42	123·6	135·3	34
43	Colombia	213·3	281·4	147·1	199·0	40	66·2	82·4	44
50	Cuba	135·3	161·4	71·9	77·0	53	63·4	84·4	42
52	Uruguay and Paraguay	129·5	147·7	78·1	102·2	50	51·4	45·5	50
53	Haiti and Dominican Republic	203·6	143·5	191·5	126·8	46	12·1	16·7	62
58	Ecuador	85·8	74·4	75·3	62·9	56	10·5	11·5	63
61	Central American Republics	70·7	55·9	50·8	27·8	60	19·9	28·1	58

Table 1 (*continued*)

Rank in imports and exports together	Imports and exports together		Imports		Rank as supplier of imports 1938	Exports		Rank as receiver of exports 1938
	1937	1938	1937	1938		1937	1938	
14 India	1,281·2	1,455·1	1,162·3	1,275·2	9	118·9	179·9	25
24 Malaya	635·6	594·7	597·1	559·6	21	38·5	35·1	54
32 Japan	499·5	468·2	338·4	368·6	26	161·1	99·6	41
34 China	459·4	449·5	327·8	254·7	37	131·6	194·8	24
36 Netherlands East Indies	438·5	416·2	360·9	280·3	35	77·6	135·9	33
54 Philippines	52·3	112·4	32·5	85·3	52	19·8	27·1	60
British Dominions								
10 Australia and New Zealand	1,520·9	1,929·2	1,436·3	1,793·2	7	84·6	136·0	32
22 Canada	665·9	786·9	527·2	620·1	19	138·7	166·8	29
26 South Africa	470·9	572·2	391·3	412·9	25	79·6	159·3	30
Middle East								
19 Egypt	719·8	806·2	537·5	484·3	22	182·3	321·9	20
47 Turkey	170·4	214·3	117·6	142·0	43	52·5	72·3	46
55 Iran	125·1	109·7	101·9	74·9	55	23·9	34·8	55
21 U.S.S.R.	830·5	798·1	718·8	622·7	18	112·0	175·4	26
Other foreign countries								
Europe	25·0	50·6	4·8	8·3	—	20·2	42·3	—
Asia	1,359·0	1,713·2	1,201·1	1,568·5	—	157·9	144·7	—
Africa	694·0	635·2	596·8	520·6	—	97·2	114·6	—
America	177·1	207·4	115·9	129·3	—	61·2	78·1	—
Oceania	31·2	27·8	30·5	26·1	—	0·7	1·7	—
Provisions supplied to foreign ships	59·6	64·0	—	—	—	59·6	64·0	—
Total trade, all countries	66,329·6	76,654·3	42,390·9	46,064·2	—	23,938·7	30,590·1	—

Table 2. *Sources of Imports, in leading categories of imports,* 1938, *by weight (in thousands of tons except where otherwise stated)*

Coal, etc.

	Anthracite	Coal	Coke	Coal agglomerates	Total
Belgium	648·5	2,909·8	602·1	538·7	4,699·1
Czechoslovakia	—	—	54·6	—	54·6
Germany	351·8	5,164·0	1,074·4	13·0	6,603·2
Great Britain	632·5	5,710 3	—	117·6	6,460·4
Indo-China	199·6	—	—	—	199·6
Morocco	35·6	—	—	—	35·6
Netherlands	113·0	1,087·2	609·5	133·9	1,943·6
Poland	—	1,570·8	—	—	1,570·8
Turkey	—	124·5	—	—	124·5
U.S.S.R.	93·1	—	—	—	93·1
Others	4·2	38·7	20·9	—	63·8
Total	2,078·3	16,605·3	2,361·5	803·2	21,848·3
Total 1937	2,789·0	21,840·6	3,859·9	964·6	29,454·1

Petroleum, 1937, 1938

	1938	1937
Iraq	3,146·8	3,129·4
U.S.A.	2,319·8	1,246·9
Venezuela	645·9	527·5
Colombia	420·1	386·7
Peru	343·8	433·0
Romania	36·4	180·7
Others	68·4	247·5
	6,981·2	6,151·7
Value, millions of francs	3,395·1	2,164·8

Table 2 (*continued*)

Principal Refined and Semi-refined Petroleum Products, 1937, 1938

	Gasoline (thousand hectolitres)		Lubricating and heavy oils (thousand tons)		Gas oils (thousand tons)		Fuel oils (thousand tons)		Road oils (thousand tons)		Total heavy products
	1938	1937	1938	1937	1938	1937	1938	1937	1938	1937	1938
U.S.A.	4,342	3,295	54·8	64·5	46·4	62·6	39·3	—	2·3	3·0	142·8
Iran	153	398	—	—	13·4	44·3	94·9	114·3	—	—	108·8
U.S.S.R.	—	—	12·8	18·1	12·5	39·6	69·7	138·5	3·7	3·5	98·7
Venezuela	56	84	0·7	1·1	7·1	28·6	47·5	107·5	—	—	55·3
Romania	2,381	4,383	—	0·1	7·4	24·9	6·7	110·7	—	—	14·1
Mexico	145	—	—	—	—	—	—	—	12·2	16·7	12·2
Netherlands East Indies	264	—	—	—	—	—	—	—	—	—	—
Other South American countries	—	—	—	—	5·9	13·7	145·7	139·0	—	—	151·6
Others	59	246	1·4	2·6	0·7	1·2	0·8	17·5	0·2	0·6	3·1
Total	7,400	8,406	69·7	86·4	93·4	214·9	404·6	627·5	18·4	23·8	586·6

Textile Materials, 1938

Imports of raw cotton	
U.S.A.	143·5
Egypt	43·3
India	38·4
Brazil	28·2
French Equatorial Africa	5·9
French West Africa	3·5
Mexico	2·7
Others	12·4
Total	277·9
Total 1937	282·3

Imports of wool	
Australia	85·2
Argentina	28·2
South Africa	23·2
New Zealand	22·4
Uruguay	2·3
India	1·3
Iraq	1·2
Great Britain	0·8
Morocco	0·5
Others	10·9
Total	176·0
Total 1937	152·7

Oilseeds (total import 1,349·2), 1938

	Ground-nuts	Coconut kernels	Linseed	Palmetto kernels	Soya beans	Castor oil seeds	Hemp seed	Other seeds
Argentina	—	—	177·6	—	—	—	—	—
Belgium	—	—	2·7	—	—	—	—	—
Brazil	—	—	—	—	—	14·0	—	—
Cameroons and Togoland	12·1	—	—	29·6	—	—	—	—
China	—	—	—	—	6·9	—	8·2	—
French Equatorial Africa	—	—	—	14·7	—	—	—	—
French West Africa	547·3	—	—	43·5	—	—	—	—
Africa, other parts	55·9	21·6	—	—	—	—	—	—
India	214·1	—	6·4	—	—	—	—	6·8
Indo-China	—	10·4	—	—	—	—	—	—
Malaya	—	12·1	—	—	—	—	—	—
Morocco	—	—	5·9	—	—	—	—	—
Netherlands East Indies	—	16·2	—	—	—	—	—	—
New Caledonia	—	3·8	—	—	—	—	—	—
French Oceania*	—	27·3	—	—	—	—	—	—
Other Pacific islands	—	11·8	—	—	—	—	—	—
Philippines	—	32·3	—	—	—	—	—	—
Uruguay	—	—	5 4	—	—	—	—	—
U.S.A.	—	—	—	—	6·3	—	—	—
Others	18·2	7·2	5·2	0 2	0·4	5·0	1·2	18·0
Total	847·6	142·7	203·2	88·0	13·6	19·0	9·4	24·8
Total 1937	896 8	137·6	274·0	70 1	29·8	18·2	—	—

* 'French Oceania' is used as a convenient short title for 'L'Etablissements Français de l'Océanie'.

Table 2 (*continued*)

Vegetable Oils, 1938

	Coco-nut oil	Ground-nut oil	Olive oil	Palm oil	Soya bean oil	Wood oil
Algeria	—	—	15·0	—	—	—
Cameroons	—	—	—	6·0	—	—
China and Hong-Kong	—	—	—	—	—	1·0
French Equatorial Africa	—	—	—	6·2	—	—
French West Africa	1·2	—	—	14·5	—	—
Indo-China	—	—	—	—	—	0·3
Netherlands	5·1	2·7	—	—	1·1	—
Sweden	—	—	—	—	0·7	—
Tunisia	—	—	15·4	—	—	—
Others	0·2	0·3	3·6	0·9	0·4	—
Total	6·5	3·0	34·0	27·6	2·2	1·3
Total 1937	10·6	1·2	19·9	29·0	1·4	1·7

All other oils, 3·1 (1937, 2·2).

Wood pulp, 1938:		
	Sweden	185·0
	Finland	146·9
	Norway	87·4
	Others	91·9
	Total	511·2
	Total 1937	875·1

Metals and Metallic Ores, 1938 (*total weight of import*, 1,356·8)

	Chrome ore	Copper, including scrap	Iron ore	Lead, all forms	Manganese ore*	Nickel concentrates	Nickel, refined	Tin, mostly metal etc.	Zinc ore	Zinc, metal
Algeria	—	—	106·4	3·1	4·5	—	—	—	—	—
Australia	—	—	—	—	—	—	—	—	20·9	—
Belgium	—	33 4	106·5	20·2	—	—	2·2	1·1	—	17·3
Bolivia	—	—	—	2·6	—	—	—	—	—	—
Brazil	—	—	—	—	28·1	—	—	—	—	—
Chile	—	39·5	—	—	—	—	—	—	—	—
China	—	—	—	—	1·7	—	—	—	—	—
Germany	—	0·6	—	—	—	—	—	—	—	—
Great Britain	—	8·0	—	—	—	—	0·7	0·8	—	—
India	1·1	—	—	—	98·6	—	—	—	—	—
Indo-China	—	—	—	—	—	—	—	0·7	—	4·2
Italy	—	—	—	—	—	—	—	—	11·9	—
Malaya	—	—	—	—	—	—	—	3·2	—	—
Morocco	—	—	—	18·2	53·6	—	—	—	—	—
Netherlands	—	—	—	—	—	—	—	2·8	—	1·7
Netherlands East Indies	—	—	—	—	—	—	—	0·4	—	—
New Caledonia	3·3	—	—	—	—	4·4	—	—	—	—
Norway	—	1·9	—	—	—	—	0·2	—	—	8·1
Peru	—	—	—	6·5	—	—	—	—	—	—
South Africa	19·7†	—	—	—	17·6	—	—	—	—	—
Sweden	—	—	102·8	—	—	—	—	—	15·4	—
Switzerland	—	2·5	—	—	—	—	0·1	—	—	—
Tunisia	—	—	81·7	16·0	—	—	—	—	—	—
Turkey	15·2	—	—	2·2	—	—	—	—	23·0	—
North America	—	—	—	—	—	—	—	—	31·5	—
Canada	—	7·1	—	2·7	—	—	0·2	—	—	1·1
Mexico	—	—	—	8·5	—	—	—	—	54·3	1·8
U.S.A.	—	20·5	—	—	—	0·1	—	—	—	—
U.S.S.R.	—	—	—	—	110·0	—	—	—	—	—
Yugoslavia	—	—	—	17·3	—	—	—	—	16·2	—
Others	0·8	9·4	39·5	3·0	6·9	—	1·7	0·8	15·3	15·2
Total	40·1	122·9	436·9	100·3	321·0	4·5	5·1	9·8	188·5	49·4
Total 1937	38·2	138·0	920·6	73·1	492·8	8·4	—	9·6	157·0	36·2

* Ore with metal content over 20%.

† From South Africa and Northern and Southern Rhodesia

Table 2 (*continued*)

Non-Metallic Minerals, principal items, 1938

	Refractory and other earths	Asbestos, crude	Clay	Kaolin	Dolomite, natural	Glass sands	Mica, crude	Phosphates, natural	Pyrites	Sulphur	
										Crude	Refined
Algeria	—	—	—	—	—	—	—	163·6	—	—	—
Argentina	—	—	—	—	—	—	0·05	—	—	—	—
Belgium	129·3	—	5·4	2·6	109·4	21·8	—	14·0	15·7	—	—
Canada	—	10·5	—	—	—	—	—	—	—	—	—
Chile	—	—	—	—	—	—	—	—	—	—	7·2
Czechoslovakia	—	—	2·2	—	—	—	—	—	—	—	—
Germany	59·5	—	56·1	1·2	—	—	—	—	—	—	—
Great Britain	1·7	—	3·0	38·0	—	—	—	—	—	—	—
Greece	—	—	—	—	—	—	—	—	23·6	3·2	—
India	—	—	—	—	—	—	0·26	—	—	—	—
Italy	—	—	—	—	—	—	—	—	—	10·8	51·5
Madagascar	—	—	—	—	—	—	0·08	—	—	—	—
Morocco	—	—	3·7	—	—	—	—	127·6	—	—	—
Norway	—	—	—	—	—	—	—	—	17·0	—	—
Portugal	—	—	—	—	—	—	—	—	287·0	149·3	—
South Africa	—	5·3*	—	—	—	—	0·22	—	—	—	—
Sweden	0·9	—	—	—	—	—	—	—	—	—	—
Tunisia	—	—	—	—	—	—	—	542·2	—	—	—
U.S.A.	3·6	—	—	—	—	—	—	—	—	—	117·0
U.S.S.R.	—	1·0	—	—	—	—	—	65·3	—	—	—
Western Asia	—	—	—	—	—	—	—	—	75·6	104·1	—
Others	10·8	0·4	2·9	1·1	2·1	0·3	0·02	—	11·5	6·1	9·8
Total	205·8	17·2	73·3	42·9	111·5	22·1	0·63	912·7	430·4	273·5	185·5
Total 1937	265·9	18·1	76·5	75·9	136·6	46·8	0·65	1,012·9	535·8	38·0	219·5

* From South Africa and Northern and Southern Rhodesia.

Chemical Products (mainly manufactures), 1938

	Ammonium sulphate	Copper sulphate	Magnesia	Sodium chloride	Phosphates	Chilean nitrates	Synthetic nitrates	Coal tar pitch	Heavy oils, distillates of coal (thousand hectolitres)
Algeria	—	—	—	27·7	—	—	—	—	—
Austria	—	—	3·7	—	—	—	—	—	—
Belgium	30·1	8·5	—	—	78·8	—	—	34·7	14·0
Chile	—	—	—	—	—	115·6	—	—	—
Czechoslovakia	—	—	2·8	—	—	—	—	—	—
Germany	22·9	0·2	—	—	—	—	26·5	79·8	—
Great Britain	5·0	11·6	—	—	—	—	—	223·4	25·6
Greece	—	—	2·4	—	—	—	—	—	—
Italy	—	—	—	12·3	—	—	—	—	—
Japan	—	—	2·7	—	—	—	—	—	—
Netherlands	7·5	—	—	—	31·0	—	—	—	—
Norway	—	—	—	—	—	—	19·6	—	—
Poland	5·0	—	—	—	—	—	—	25·8	—
Tunisia	—	—	—	5·5	—	—	—	—	—
U.S.A.	—	—	—	—	—	—	42·7	18·9	—
North America	—	—	—	15·9	—	—	—	—	—
U.S.S.R.	—	—	—	—	—	—	—	126·3	—
Yugoslavia	—	—	2·2	—	—	—	—	—	—
Others	—	—	1·5	7·9	5·5	—	—	17·2	1·5
Total	70·5	20·3	15·3	69·3	115·3	115·6	88·8	526·1	41·1
Total 1937	44·6	—	15·8	6·8	89·6	83·1	43·8	618·8	47·0

Of the 21·6 thousand tons of sulphuric acid imported 21·4 were supplied by Belgium (total import in 1937, 19·3); of the 24·1 thousand tons of barium sulphate imported 19·4 were supplied by Germany and 3·4 by Greece (total import in 1937, 20·4).

Table 2 (continued)

Cereals, Maize, Bananas and Citrus Fruit, 1938

	Wheat	Barley	Oats	Maize	Rice	Bananas	Citrus fruits
Algeria	103·5	13·9	0·8	—	—	—	20·9
Argentina	—	—	0·3	—	—	—	—
Cameroons	—	—	—	8·5	—	22·8	—
Canada	163·3	—	—	—	—	—	—
Denmark	—	10·6	0·5	—	—	—	—
French West Africa	—	—	—	31·0	—	65·7	—
Guadeloupe	—	—	—	—	—	51·6	—
Martinique	—	—	—	—	—	37·3	—
Indo-China	—	—	—	568·8	571·5	—	—
Italy	—	—	—	—	8·8	—	20·2
Madagascar	—	—	—	56·1	5·3	—	—
Morocco	91·9	20·3	8·4	—	—	—	—
Poland	—	14·0	—	—	—	—	—
Spain	—	—	—	—	—	—	88·0
Syria	—	—	—	—	—	—	16·8
Togoland	—	—	—	15·8	—	—	—
Tunisia	75·3	9·6	4·8	—	—	—	—
U.S.A.	21·3	—	—	11·2	—	—	—
Others	4·9	5·2	0·5	16·6	15·1	1·0	32·3
Total	460·2	73·6	15·3	708·0	600·7	178·4	178·2
Total 1937	462·3	125·6	78·8	750·2	756·8	150·0	211·4

Tropical and Sub-tropical Produce, 1938

	Cane sugar	Coffee	Cacao	Leaf tobacco	Rubber
Algeria	—	—	—	10·6	—
Brazil	—	85·3	—	—	—
Cameroons	—	4·5	7·8	—	—
Cuba	54·9	—	—	—	—
Dominican Republic	38·3	6·5	—	—	—
French Equatorial Africa	—	2·1	—	—	—
French West Africa	—	13·4	21·9	—	—
French Oceania	—	—	1·6	—	—
Guadeloupe	45·6	—	—	—	—
Hungary	—	—	—	1·6	—
Indo-China	1·2	—	—	—	15·1
Madagascar	7·6	35·5	—	1·3	—
Malaya	—	—	—	—	41·6
Martinique	47·1	—	—	—	—
Netherlands	—	—	1·3	—	—
Netherlands East Indies	29·8	7·1	—	—	4·1
Réunion	80·2	—	—	—	—
Togoland	—	—	6·4	—	—
U.S.A.	—	—	—	9·2	—
Others	—	31·9	3·4	3·2	3·9
Total	304·7	186·3	42·4	25·9	64·7
Total 1937	193·6	185·3	41·5	25·5	63·5

Of an import of scrap rubber of 2·5, 1·8 was supplied by Great Britain and 0·4 by U.S.A.

Table 2 (*continued*)

Certain Items of Machinery and Boilers (*metric quintals*), 1938

	Boilers	Steam engines, pumps, etc.	Internal combustion engines	Farm tractors	Dynamos and trans-formers	Metal working machines	Type-writers, etc.
Belgium	1,496	999	1,348	—	—	4,547	—
Czechoslovakia	1,627	—	—	—	—	—	—
Germany	—	5,123	5,676	18,012	10,711	14,705	1,077
Great Britain	3,131	1,628	1,695	1,600	1,259	1,088	—
Hungary	—	—	—	3,138	—	—	—
Sweden	—	—	—	—	3,200	—	—
Switzerland	—	4,360	2,354	1,026	4,379	—	350
U.S.A.	—	4,192	—	20,754	1,595	6,092	2,939
Others	1,655	1,680	1,198	2,323	1,973	261	308
Total	7,909	17,982	12,271	46,853	23,117	26,693	4,674

Table 3. *Certain Groups of Exports: Wool, Cotton Material* and Rags*, 1938

	Wool	Cotton	Rags
Belgium	12·3	4·4	21·2
Czechoslovakia	4·6	—	—
Germany	8·4	3·9	10·2
Great Britain	13·0	2·4	5·7
Italy	—	—	3·1
Netherlands	—	2·5	—
Switzerland	2·9	2·0	1·3
U.S.A.	2·1	—	14·2
Others	16·1	2·9	7·5
Total	59·4	18·1	63·2

* Including raw cotton, linters, etc.

Iron Ore, Iron, and Iron and Steel Products (principally steel), 1938

Destination	Iron ore	Iron and steel scrap	Pig-iron	Ingots, blooms, billets	Bars	Sheets	Iron or steel flat plates	Gal-vanized iron	Tin plate	Iron and steel wire	Iron and steel rails	Wheels and tyres for rolling stock	Tool steel	Machine steel	Ferro alloys and special steels	Other steels	Total iron and steel products
Great Britain	337·6	29·0	96·0	114·0	70·4	4·4	4·4	—	—	—	1·5	—	—	10·6	2·2	0·4	207·9
Switzerland	—	—	21·9	31·9	40·3	3·1	18·9	0·9	1·6	—	4·3	1·2	0·36	2·7	3·7	2·2	111·16
Belgium	9,145·5	97·9	71·9	10·2	26·9	2·0	3·5	4·6	7·2	11·7	1·5	1·2	0·82	—	13·0	—	82·62
Netherlands	95·1	16·4	0·2	0·2	20·0	2·8	16·2	0·8	0·4	3·4	7·6	1·5	—	7·8	—	—	60·7
Sweden	—	—	26·1	—	30·7	1·2	3·9	—	—	—	1·8	—	—	6·4	3·2	—	47·2
Italy	—	85·7	—	14·6	21·0	0·7	1·4	—	—	—	—	—	0·1	—	1·4	2·4	41·6
Norway	—	—	—	—	20·6	0·4	5·8	1·6	—	—	—	0·4	—	4·8	—	—	33·6
Portugal	—	—	5·2	—	11·8	1·8	3·5	0·5	4·2	1·5	—	0·6	—	—	—	—	23·9
Finland	—	—	—	7·3	3·2	0·2	1·1	0·2	—	—	4·0	—	—	2·8	—	—	18·8
Denmark	—	—	—	—	1·8	—	—	—	—	—	—	—	—	10·4	—	—	12·2
Bulgaria	—	—	—	—	—	—	—	—	—	—	10·5	—	—	—	—	—	10·5
Spain	—	14·3	23·9	—	—	1·4	2·4	—	—	—	—	—	—	—	—	0·5	4·3
Estonia	—	—	—	—	3·3	—	—	—	—	—	—	0·3	—	—	—	—	3·6
Lithuania	—	—	—	—	—	0·2	—	—	—	—	—	—	—	3·3	—	—	3·5
Eire	—	—	—	—	—	—	2·6	0·3	—	—	—	—	—	—	—	—	2·9
Germany	5,864·4	74·4	225·4	1·6	—	—	—	—	—	—	—	—	—	—	0·9	—	2·5
Czechoslovakia	58·0	2·7	—	—	—	—	—	—	—	—	—	—	0·14	—	0·3	—	0·44
Yugoslavia	—	18·3	—	—	—	—	0·4	—	—	—	—	—	—	—	—	—	0·4
Greece	—	—	5·5	—	—	—	0·3	—	—	—	—	—	—	—	—	—	0·3
Poland	—	44·1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Romania	—	38·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hungary	—	1·5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Argentina	—	—	17·9	—	40·5	2·8	16·3	0·2	5·0	6·7	10·2	2·3	—	—	—	0·3	84·3
Brazil	—	—	—	—	—	0·4	—	0·2	—	—	1·7	0·9	—	—	—	—	3·2
U.S.A.	—	—	—	—	16·3	2·2	—	—	—	—	1·0	—	—	—	1·3	0·3	21·1
Algeria	—	—	—	—	45·1	3·6	7·5	1·4	1·3	9·0	2·5	1·5	0·04	1·8	—	0·4	74·14
Indo-China	—	—	—	—	21·0	0·6	5·9	1·8	0·7	2·9	9·4	0·5	0·03	6·2	—	0·2	49·23
Tunisia	—	—	—	—	15·6	0·2	3·4	0·7	0·7	0·8	3·6	0·8	—	—	—	0·1	25·9
French West Africa	—	—	—	—	12·2	0·1	1·0	1·0	—	—	3·1	—	—	—	—	—	17·4
Morocco	—	—	—	—	10·2	0·1	1·6	0·8	1·1	1·9	—	0·5	—	—	—	0·1	16·3
Madagascar	—	—	—	—	2·8	0·1	—	1·4	1·3	—	—	—	—	—	—	—	5·6
Syria	—	—	—	—	4·2	—	—	—	—	—	—	—	—	—	—	—	4·2
China	—	—	—	—	15·7	—	7·5	—	—	0·8	11·0	—	0·07	—	—	—	35·07
Egypt	—	—	—	—	11·3	0·3	7·1	1·4	—	0·5	4·9	—	—	—	—	—	25·5
Netherlands East Indies	—	—	—	—	10·9	—	4·1	3·9	—	1·2	3·1	0·7	—	—	—	—	23·9
India	—	—	—	—	6·6	1·7	4·9	—	—	1·7	1·1	—	—	—	—	—	16·0
Palestine	—	—	—	—	4·3	—	—	—	—	—	—	—	—	—	—	—	4·3
Malaya	—	—	—	—	—	—	1·6	—	—	0·8	1·2	—	—	—	—	—	3·6
Japan	—	—	—	—	—	—	—	—	—	—	1·6	—	0·34	—	—	—	1·94
All others	12·5	21·7	33·7	2·5	42·6	4·7	13·4	4·8	1·2	5·1	11·4	1·1	0·2	5·1	3·6	1·8	97·5
Total	15,513·1	444·6	527·7	182·3	509·3	35·0	138·7	26·5	24·7	48·0	97·0	13·5	2·10	61·9	29·6	8·7	1,177·3

Table 3 (*continued*).

Metal Manufactures: Textile Machinery and Iron and Steel Tubes (metric quintals), 1938

Textile machinery	
Belgium	15,023
Great Britain	8,404
Bulgaria	4,382
Poland	4,161
Switzerland	4,170
Germany and Austria	3,549
Netherlands	2,443
Portugal	2,089
Eire	1,364
Turkey	8,501
Egypt	7,195
Brazil	13,566
Colombia	2,532
Argentina	2,359
French colonies	10,389
Other countries	15,013
Total	105,140

Iron and steel tubes	
Belgium	19,034
Great Britain	5,614
Switzerland	24,604
Portugal	11,094
Finland	5,590
Spain	16,477
Romania	39,692
Netherlands	30,605
South Africa	10,072
Netherlands East Indies	54,079
Brazil	5,560
Argentina	44,790
Colombia	12,164
Venezuela	34,700
Central America and West Indies	21,730
U.S.A.	21,906
U.S.S.R.	34,600
French colonies	134,615
Other countries	70,877
Total	597,803

Table 4. *Detailed Statement of Trade with Belgium, Great Britain, Germany, Switzerland, Netherlands, U.S.A., Argentina, Algeria, Indo-China, French West and Equatorial Africa, Tunisia*, 1938

All values in millions of francs; all weights in thousands of metric tons, except where otherwise stated (m.t. metric tons, th.g.t. thousand gross tons, hl. hectolitres).

The list of countries for which these statistics are given includes all the more important customers of France, and several of special interest—Argentina, an important French market in South America, and the leading French colonies. Each table specifies all groups or commodities reaching an export or import value of over 20 million francs.

	Quantity	Value
BELGIUM. Imports into France		
Coal, etc.	4,699·4	1,059·2
Copper	34·4	248·2
Flax	25·4	207·1
Precious stones, cut or uncut	—	115·9
Wool and wool waste	5·3	104·0
Fresh vegetables	49·6	103·4
Nickel	2·3	69·3
Building materials	1,088·4	65·0
Prime movers, etc.	4·6	64·3
Lead	18·4	61·4
Phosphate fertilisers	78·8	51·6
Metal manufactures	6·2	49·9
Machine parts	3·1	45·1
Zinc	17·3	44·6

Stone and earth	288·2	42·2
Fodder and malt	36·3	41·1
Books and printed matter	2·9	37·6
Tin	1·2	37·5
Distillates of coal tar pitch	159·3	36·5
Chemicals	40·4	34·0
Rubber manufactures	2·6	32·3
Rags	14·3	30·4
Ammonium sulphate	30·2	30·0
Paper	4·1	27·8
Crude hide parings for glue manufacture	9·8	24·8
Copper sulphate	8·5	23·6
Jute yarns, etc.	5·4	22·2
Iron and steel	13·4	22·0
Prepared skins	783·0 m.t.	20·7
Total value of all imports 1938		3,159·5
1937		3,059·6
Exports to Belgium		
Ores	9,174·0	481·7
Wool and wool waste	19·5	408·2
Potassium chloride	547·0	331·3
Unworked skins and furs	19·0	215·5
Iron and steel	169·8	169·8
Precious stones, cut or uncut	—	163·8
Flax	98·3	141·7
Wines	120,547·0 hl.	120·5
Motor cars and parts thereof	4·4 2,019 in number	104·0
Common timber	324·3	103·0
Prime movers, etc.	8·3	92·4
Caustic soda	13·3	22·7
Carbonate of soda	47·1	34·2
Other chemicals	35·3	86·6
Woollen yarns	2,270·0 m.t.	81·7
Linen, hemp and ramie yarn	3,717·0	71·6
Books and printed matter	8·2	68·3
Coal, etc.	393·0	68·0
Fruit (fresh, preserved, etc.)	28·8	56·1
Rags	21·2	55·4
Silk and rayon tissues	325·2 m.t.	49·6
Prepared skins	1,233·0 m.t.	45·3
Pig-iron	71·9	43·4
Machine parts	9·1	39·6
Paper	3·1	36·4
Copper	7·6	34·8
Cotton yarns	1,012·0 m.t.	30·7
Fodder and malt	28·9	28·8
Natural pearls	—	28·6
Building materials	326·0	26·9
Ferro-alloys	11·6	25·1
Aluminium	1·9	22·9
Raw cotton and cotton waste	5·4	22·8
Cereals	18·8	22·3
Woollen tissues	227·0 m.t.	21·2
Colours, inks, crayons	5·2	20·4
Wooden manufactures	3·4	20·2
Silk and rayon yarns	397·0 m.t.	16·2
Total value of all exports 1938		4,181·3
1937		3,146·0

Table 4 (*continued*)

	Quantity	Value
GREAT BRITAIN AND NORTHERN IRELAND.	Imports into France	
Coal, etc.	6,476·4	1,491·0
Precious stones, cut or uncut	—	259·1
Prime movers, etc.	5·0	167·9
Distillates of coal tar pitch	247·3	112·6
Metal manufactures	2·9	94·6
Machine parts	1·9	86·7
Woollen tissues	448·0 m.t.	66·0
Mineral pitch, bitumen and asphalt	122·1	62·8
Rags	78·4	59·3
Copper	8·1	48·1
Wool and wool waste	2·6	38·0
Nickel	1·2	36·7
Chemicals	10·7	36·4
Natural pearls	—	35·5
Manufactures of rubber	1·0	33·7
Ships	11·2 th.g.t.	33·1
Copper sulphate	11·5	32·9
Tin	0·9	28·9
Prepared skins	807·0 m.t.	23·7
Manufactured tobacco	300·0 m.t.	21·6
Total value of all imports 1938		3,231·7
1937		3,383·7
Exports from France		
Silk and rayon tissues	1,400·0 m.t	299·7
Wool and wool waste	13·1	285·5
Iron and steel	235·6	229·3
Precious stones	—	195·3
Wines	92,850·0 hl.	147·9
Fruit (fresh and preserved)	46·1	144·2
Stones and furs, unworked	7·2	113·6
Eaux-de-vie and spirits	14,347·0 hl.	105·1
Prime movers, etc.	6·7	84·4
Manufactures of wood	8·0	76·9
Woollen tissues	930·2 m.t.	70·0
Chemicals	20·4	69·8
Motor cars and parts thereof	2·7 1,399 in number	66·7
Prepared skins	1,130·0 m.t.	66·3
Common timber	397·7	62·1
Pig-iron	95·7	60·3
Natural pearls	—	58·0
Cereals	50·9	53·7
Ores	527·1	50·9
Lingerie, clothing, etc.	137·0 m.t.	47·8
Woollen yarns	884·0 m.t.	44·6
Aluminium	3·6	43·0
Sugar preparations	4·3	42·0
Metal manufactures	6·0	41·5
Hide and leather goods	262·0 m.t.	40·7
Heavy oils and petroleum residues	77·5	39·9
Prepared furs	89·0 m.t.	34·9
Vegetable oils, essences, perfumes	231·0 m.t.	33·7
Toys and fans	561·0 m.t.	32·1
Collectors' objects	—	31·7
Fresh vegetables	17·3	30·2

Tartaric acid and tartrates	5·2	28·4
Rags	5·7	26·7
Machine parts	1·3	24·9
Resins, etc.	12·4	23·7
Animal hair, raw or corded	349·0 m.t.	23·2
Cotton tissues	307·0 m.t.	2·1
Copper	4·3	21·4
Olive oil	2·3	20·8
Total value of all exports 1938		3,558·9
1937		2,720·4

GERMANY. Imports into France

Coal	6,618·3	1,354·8
Prime movers, etc.	20·8	513·3
Metal manufactures	11·1	182·2
Machine parts	5·1	145·4
Chemicals (not including nitrates)	49·2	112·7
Lignite	248·0	51·5
Scientific instruments	300·0 m.t.	48·7
Dyestuffs	300·0 m.t.	44·9
Paper	6·2	40·9
Stone and earth	120·6	38·3
Glass and crystalware	2·5	30·8
Distillates of coal tar pitch	82·0	30·1
Synthetic sodium nitrate	26·1	26·6
Pottery, etc.	19·3	25·0
Iron and steel	3·9	23·4
Ammonium sulphate	22·9	22·9
Toys	348·0 m.t.	20·0
Total value of all imports 1938		3,153·2
1937		3,248·6

Exports from France

Ores of all kinds	5,949·5	478·1
Wool and wool waste	8·1	268·0
Pig-iron	235·5	132·8
Skins and furs, unworked	9·2	107·0
Fruits (fresh and preserved)	74·4	85·0
Wines	86,104·0 hl.	51·2
Silk and rayon yarns	973·0 m.t.	44·1
Dyestuffs	784·0 m.t.	38·7
Woollen yarns	691·0 m.t.	32·4
Resins, etc.	12·7	25·3
Rags	10·7	24·6
Animal greases other than fish	4·7	22·7
Phosphatic fertilisers	112·8	22·2
Raw cotton and cotton waste	4·3	21·8
Prepared skins	441·0 m.t.	21·4
Prepared furs	34·0 m.t.	18·3
Iron and steel	76·2	16·9
Silk and rayon tissues	44·6 m.t.	16·0
Total value of all exports 1938		1,851·0
1937		1,415·0

Table 4 (*continued*)

	Quantity	Value
SWITZERLAND. Imports into France		
Prime movers, etc.	3·9	152·7
Clocks, watches, etc.	—	111·3
Cheese	6·5	93·0
Dyestuffs	654·0 m.t.	84·1
Electricity	—	52·7
Machine parts	1·2	45·7
Metal manufactures	3·5	44·2
Precious stones, cut or uncut	—	30·8
Chemicals	2·6	28·5
Copper	2·9	26·0
Hide and leather goods	225·0 m.t.	23·3
Cotton tissues	227·0 m.t.	21·4
Total value of all imports 1938		991·2
1937		813·8
Exports from France		
Iron and steel	110·1	194·9
Coal, etc.	523·2	138·3
Wool and wool waste	3·2	92·8
Fruit (fresh and preserved)	40·0	83·3
Wines	220,449·0	82·1
Silk and rayon yarns	1,468·0 m.t.	52·6
Fresh vegetables	21·5	51·3
Chemicals	13·2	47·4
Precious stones	—	46·4
Metal manufactures	9·7	42·7
Woollen tissues	466·0 m.t.	38·2
Motor cars and parts thereof	1·5 1,270 in number	35·6
Prepared skins	758·0 m.t.	34·2
Raw silk	680·0 m.t.	33·4
Common timber	86·8	28·8
Silk and rayon tissues	127·2 m.t.	28·3
Prime movers	1·7	28·2
Woollen yarns	466·0 m.t.	25·4
Books and printed matter	2·0	23·2
Cereals	9·1	22·9
Anhydrous alumina	16·0	21·3
Total value of all exports 1938		1,929·7
1937		1,445·8

NETHERLANDS. Imports into France		
Coal	1,944·5	440·8
Tin	2·8	92·5
Potatoes	60·0	59·2
Hides and skins	3·9	46·3
Cheese	3·5	45·0
Ships	40·7 th.g.t.	40·7
Precious stones, cut and uncut	—	37·3
Prime movers, etc.	0·5	31·6
Glass and crystalware	0·2	29·4
Vegetable oils, refined	9·3	29·0

Spices	2·2	28·4
Seed grains	2·6	22·9
Distillates of coal tar pitch	20·1	22·4
Total value of all imports 1938		1,187·0
1937		1,056·3

Exports from France

Woollen yarns	3·0	112·6
Iron and steel	77·9	111·3
Chemicals	78·9	103·4
Potassium chloride	139·2	89·3
Hides and skins	8·8	77·9
Silk and rayon tissues	672·0 m.t.	61·4
Motor cars and parts thereof	1·7 1,428 in number	42·5
Metal manufactures	14·7	42·4
Precious stones, cut or uncut	—	35·9
Prime movers, etc.	2·6	35·1
Wool	1·4	34·4
Wines	29,990·0 hl.	28·9
Prepared skins	587·0 m.t.	25·7
Cotton yarns	1·2	25·5
Common timber	60·4	25·1
Cereals	26·7	23·7
Heavy oils and petroleum residues	41·0	21·9
Woollen tissues	302·0 m.t.	21·8
Total value of all exports 1938		1,345·1
1937		831·3

U.S.A. Imports into France

Petroleum and refined petroleum products	2,637·0	1,559·2
Raw cotton	158·8	1,149·9
Prime movers, etc.	10·1	475·0
Fruit, fresh and preserved	88·6	318·3
Heavy oils and petroleum residues	181·4	197·3
Motor cars and parts thereof	9·0 1,601 in number	163·1
Copper	21·0	158·3
Chemicals	52·6	107·7
Tobacco, unmanufactured	9·2	95·8
Sulphur, including pyrites	117·0	92·5
Metal manufactures	3·6	84·4
Machine parts	2·4	84·0
Colours, inks, crayons	14·6	62·0
Hides, skins and furs	529·0 m.t.	50·6
Cereals	34·1	48·6
Manufactures of tobacco	676·0 m.t.	43·9
Common timber	18·9	37·6
Prepared skins	166·0	28·8
Cellulose pulp	8·7	25·9
Distillates of coal tar pitch	31·4	24·5
Scientific instruments and apparatus	198·0 m.t.	23·2
Ores	1·2	22·8
Cinematograph film	12,050·0 th.metres	22·7
Rubber manufactures	2·1	21·4
Total value of all imports 1938		5,277·3
1937		4,033·2

Table 4 (*continued*)

U.S.A. (*continued*)	Quantity	Value
Exports from France		
Paper	12·5	199·4
Wines	49,232·0 hl.	117·7
Silk and rayon tissues	530·0 m.t.	115·1
Hides and skins	6·2	107·7
Brandy and spirits	9,951·0 hl.	92·7
Cotton tissues	742	62·5
Vegetable essences and perfumes	269·0 m.t.	58·6
Hide and leather goods	156·0 m.t.	55·0
Tartaric acid and tartrates	7·1	44·1
Olive oil	4·6	42·4
Prepared skins	362·0 m.t.	36·5
Aluminium	3·3	36·3
Wool	2·1	34·9
Liqueurs	6,704·0 hl.	34·5
Chemicals	5·8	31·7
Precious stones, cut and uncut	—	31·1
Collectors' objects	—	27·0
Cheese	1·7	25·3
Iron and steel	20·0	24·7
Woollen tissues	334·0	23·3
Soaps and perfumes	467·0	23·1
Total value of all exports 1938		1,682·8
1937		1,535·5

ARGENTINA. Imports into France	Quantity	Value
Wool	37·3	370·8
Oilseeds	178·4	336·8
Hides and skins	3·6	44·1
Meat	7·0	38·2
Quebracho extract	9·4	27·6
Cereals	17·8	24·7
Total value of all imports 1938		936·3
1937		942·3
Exports from France		
Iron and steel	85·0	150·9
Metal manufactures	17·8	46·0
Silk and rayon tissues	182·5 m.t.	43·8
Vegetable oils, refines	3·9	35·7
Woollen tissues	337·0 m.t.	28·5
Cycles, motor-cycles, parts and coachwork	620·0 m.t.	28·4
Medicinal preparations	349·0 m.t.	22·4
Prime movers	1·7	21·5
Cotton yarns	508·0 m.t.	20·9
Total value of all exports 1938		729·4
1937		534·4

ALGERIA. Imports into France

Wines	15,010,221·0 hl.	2,969·9
Cereals	146·3	307·0
Fruit (fresh, preserved)	107·3	269·9
Groats, pearl barley, etc.	72·1	208·0
Animals	30·7	154·0
Fresh vegetables	61·3	122·6
Olive oil	15·1	97·0
Potatoes	69·2	91·0
Eaux-de-vie and spirits	166,512·0 hl.	88·0
Tobacco, unmanufactured	10·6	80·7
Wool	7·3	63·9
Fodder	47·8	50·9
Cork	3·5	38·7
Stone and earth	171·5	33·4
Common timber	10·7	28·1
Unworked hides and skins	2·8	26·8
Ores	119·6	26·5
Dried vegetables	12·5	24·9
Dried and preserved fish	4·4	22·3
Total value of all imports 1938		4,864·0
1937		3,807·3

Exports from France

Cotton tissues	14,885·0 m.t.	424·0
Sugar, crude and refined	74·5	268·4
Metal manufactures	41·8	183·3
Motor cars and parts thereof	7·9 4,514 in number	169·1
Prime movers	9·5	134·4
Olive oil, etc.	28·6	121·7
Iron and steel	77·2	117·6
Soap and perfumes	28·3	95·7
Gasoline, etc.	118·0	88·1
Machine parts	5·5	80·8
Paper	21·6	77·2
Chemicals	36·6	73·2
Rubber manufactures	3·4	70·0
Cheese	5·6	68·8
Common timber	75·0	55·5
Silk and rayon tissues	991·5 m.t.	53·9
Building materials	214·7	52·9
Sugar preparations	6·5	50·7
Hide and leather goods	1,872·0 m.t.	44·8
Lingerie and clothing	3,200·0 m.t.	44·6
Phosphatic fertilizers	65·1	43·3
Medicinal preparations	2·1	42·4
Jute tissues	6·4	41·0
Potatoes	53·1	40·0
Butter	1·9	39·3
Coachwork, cycles, motor cycles	4·2	38·8
Glass and crystalware	8·8	35·6
Manufactures of wood	12·3	35·0
Prepared skins	2,213·7 m.t.	32·8
Heavy oils	40·8	32·0
Groats, pearl barley, etc.	12·0	26·9
Meat preserves	1·7	26·2
Wines	22,036·0 hl.	24·7
Toys and fancy goods	1·4	23·5

Table 4 (*continued*)

	Quantity	Value
ALGERIA (*continued*)		
Chocolate	2·1	23·5
Colours, inks, crayons	4·5	23·3
Dried vegetables	6·6	23·1
Postal packages	9·9	411·1
Total value of all exports 1938		3,779·5
1937		3,289·7

INDO-CHINA. Imports into France		
Rice	571·5	748·5
Maize	568·8	694·1
Crude rubber	15·1	163·9
Coal	203·5	76·0
Oilseeds	12·6	27·3
Tin	0·7	23·1
Total value of all imports 1938		1,890·6
1937		1,651·8
Exports from France		
Cotton tissues	7·8	212·0
Silk and rayon tissues	1,154·9 m.t.	84·2
Iron and steel	50·8	73·4
Metal manufactures	17·4	65·5
Motor cars and parts thereof	2·0 1,249 in number	35·8
Prime movers, etc.	2·5	35·0
Paper	6·3	30·3
Rubber manufactures	1·5	27·9
Cycles, motor cycles, parts thereof and coachwork	1·8	23·9
Machine parts	1·8	23·7
Chemicals	10·1	22·3
Total value of all exports 1938		928·9
1937		739·2

FRENCH WEST AND EQUATORIAL AFRICA. Imports into France		
Oilseeds	612·4	1,014·5
Common timber	177·7	152·4
Fruits	66 2	114·2
Coffee	15·5	105·4
Cacao	22·3	93·9
Cotton	9·4	72·6
Vegetable oils	22·2	58·2
Maize	31·0	34·7
Gums, etc.	4·5	22·3
Total value of all imports 1938		1,752·6
1937		1,658·5

Exports from France

Cotton tissues	8·8	247·9
Metal manufactures	21·3	75·7
Motor cars and parts thereof	2·4 1,372 in number	51·6
Prime movers, etc.	4·0	50·4
Iron and steel	21·5	31·7
Building materials	125·2	28·5
Cotton yarn	1·4	27·6
Rubber manufactures	1·1	25·1
Wines	56,831·0 hl.	21·4
Machine parts	1·8	21·2
Total value of all exports 1938		852·1
1937		611·8

TUNISIA. Imports into France

Wines	1,108,417·0 hl.	225·2
Cereals	103·0	215·5
Olive oil	15·4	121·4
Natural phosphates	542·1	96·9
Lead	16·1	51·2
Groats, pearl barley, etc.	9·0	25·9
Total value of all imports 1938		878·5
1937		741·4

Exports from France

Cotton tissues	4·7	128·0
Metal manufactures	18·6	66·9
Sugar, raw or refined	34·7	62·3
Olive and other oil	14.4	49·7
Motor cars and parts thereof	2·2 1548 in number	49·7
Iron and steel	27·0	40·7
Prime movers, etc.	2·5	33·9
Machine parts	2·4	29·3
Postal packages	2·1	131·7
Total value of all exports 1938		980·5
1937		798·6

For sources of statistics in the preceding tables see p. 347.

Table 5. *The Principal Commodity Markets of France*

Paris:
- Cereals and flour
- Vegetables
- Sugar, white
- Meat
- Fish
- Provisions
- Milk
- Eggs
- Metals:
  - Iron and steel merchant bars
  - Soft steel sheets
  - Tin plate
  - Straits tin
  - Aluminium, ingots
  - Copper, ingots
  - Lead
  - Zinc
- Hides and skins (butchers')
- Benzol
- Plantation rubber
- Paper
- Oak and deals
- Lime, cement, plaster, bricks

Havre:
- Rice
- Coffee, Brazilian
- Cacao, Brazilian
- Coal, Cardiff
- Cotton, American
- Hides, Brazilian

Dunkirk:
- Maize
- Sodium nitrate
- Ammonium sulphate

Bordeaux:
- Turpentine
- Pit-props
- Copper sulphate
- Fine red and white wine

Rouen:
- Gasoline

Lyons:
- Sugar, best refined
- Raw silk
- Nickel
- Denatured alcohol
- Linseed oil
- Ground-nut oil
- Sulphuric acid
- Hydrochloric acid
- Sodium carbonate
- Calcium carbide

Marseilles:
- Ground-nut oil
- Sulphur
- White soap
- Stearine
- Glycerine
- Oleine
- Wheat, Russian and Romanian
- Cotton, Indian and Egyptian
- Bauxite

Lille:
- Malt
- Linen yarn
- Hemp yarn
- Jute yarn

Roubaix-Tourcoing:
- Combed wool
- Woollen yarn

Epinal:
- Cotton yarn (American)
- Calico

Strasbourg:
- Hops
- Potassium chloride

Pas-de-Calais:
- Coal

Thionville:
- Basic slag

Béziers:
- Red wine

Dijon:
- Burgundy wine

Reims and Epernay:
- Champagne

Cognac:
- Brandy

For various other products the market is in the producing locality; walnuts at Grenoble, truffles at Périgueux, early fruits and vegetables at Avignon, Norman dairy produce at Lisieux.

Table 6. *The French Mercantile Marine*, 1939

Statistics from *Bureau Veritas: International Register of Shipping and Aircraft*, 1939–40

(i) Leading Companies' Fleets, 1939 (Companies owning more than 60,000 tons of ships over 1,000 tons gross)

(S = steam, M = motor)

Company	Services	Ships over 1,000 tons gross							Tonnage of ships over 1,000 gross tons (in thousands)
		Type	1,000–4,999	5,000–9,999	10,000–14,999	15,000–19,999	Over 20,000	Total	
Cie Gén. Transatlantique	U.S.A., W. I., Pacific, Med.	S	14	22	5	1	3	45	447·5
		M	3	2	—	—	—	5	
Cie des Messageries Maritimes	Med., E. and W. Africa, East	S	1	18	9	2	—	30	359·0
		M	1	2	3	2	—	8	
Chargeurs Réunis	Med., E. and W. Africa, East, Plate	S	6	31	2	—	—	39	276·9
		M	—	—	1	—	—	1	
Soc. Nat. des Chemins-de-Fer Français	U.K., Cont., Med., W. Africa	S	19	5	—	—	—	24	112·1
		M	—	—	—	—	—	—	
Soc. Gén. des Transports Mar. à Vapeur	Med., W. Africa, Plate	S	7	5	1	—	—	13	81·5
		M	1	—	—	—	—	1	
Soc. Française de Transports Pétroliers	Tanker	S	—	—	—	—	—	—	73·6
		M	—	8	—	—	—	8	
Cie Gén. d'Armements Mar., etc.	Baltic, Med., W. I.	S	13	—	—	—	—	13	67·2
		M	7	—	—	—	—	7	
Cie de Nav. Paquet	Med., W. Africa	S	10	5	—	—	—	15	67·1
		M	1	—	—	—	—	1	
Cie de Nav. Mixte	Med.	S	11	5	—	—	—	16	65·9
		M	1	—	—	—	—	1	
Cie Auxiliare de Nav.	Tanker	S	—	4	—	—	—	4	64·7
		M	—	7	1	—	—	8	
Cie Cyprien-Fabre	Med., New York, W. Africa	S	2	2	3	—	—	7	63·2
		M	1	—	—	—	—	1	
Soc. Gén. de Nav. à Vapeur	—	S	2	3	2	—	—	7	60·2
		M	—	—	—	—	—	—	

Table 6 (*continued*)

(ii) Classification by size of all ships over 1,000 gross tons

In the following table all ships of 1,000–1,999 tons are grouped as 1,000 tons, ships of 2,000–2,999 as 2,000 tons, and so on.

Tonnage group (thousands of tons)	No. of steam ships	No. of motor ships	Total no. of ships
83	1	—	1
43	1	—	1
28	1	—	1
18	1	—	1
17	—	2	2
15	3	—	3
14	1	1	2
13	2	1	3
12	4	1	5
11	6	3	9
10	9	1	10
9	19	9	28
8	23	1	24
7	20	5	25
6	14	1	15
5	57	7	64
4	62	3	65
3	82	11	93
2	105	5	110
1	123	10	133
Total	534	61	595

(iii) Classification by age and size of sea-going tanker fleet (September 1939)

Gross tonnage, in thousands of tons	Period of building						Total
	1919 or earlier	1920–3	1924–7	1928–31	1932–5	1936–9	
12–14	—	—	1	—	1	1	3
9	—	—	—	5	—	7	12
8	—	—	—	—	—	—	—
7	—	4	—	6	—	—	10
6	—	3	—	—	—	—	3
5	5	2	2	—	—	—	9
1–4	4	3	—	6	—	2	15
Under 1,000	2	6	3	5	2	4	22
Not known	—	—	—	—	—	2	2
Total	11	18	6	22	3	16	76

Appendix I

FOREIGN POPULATION IN FRANCE

General Features: Immigration after 1918: Italians in 1931: Poles in 1931: Spaniards in 1931: Belgians in 1931: The Refugee Problem: Bibliographical Note

GENERAL FEATURES

From the middle of the nineteenth century onwards the volume of immigration into France increased to very considerable figures. The absolute number of foreigners rose from 379,000 in 1851 to 2,891,000 in 1931, but during the next five years the number decreased to 2,453,507. The returns distinguish between *présente* and *légale*, or habitually resident, population.* The following table gives the *légale* population for each year:

Foreign Population in France, 1851–1936

Year	Foreigners	% of total pop.	Naturalized
1851	379,289	1·05	13,500
1861	506,331	1·35	Not available
1866	655,036	1·72	
1872	740,668	2·05	
1876	801,754	2·18	
1881	1,000,454	2·66	77,046
1886	1,115,214	2·92	103,886
1891	1,101,798	2·87	170,704
1896	1,027,421	2·67	202,715
1901	1,037,778	2·67	221,784
1906	1,009,414	2·56	222,162
1911	1,132,696	2·86	252,790
1921	1,550,459	3·96	254,343
1926	2,505,047	6·15	248,727
1931	2,891,168	6·91	361,231
1936	2,453,507	5·80	Not available

From successive *Recensements général* (Paris).

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* This distinction between *présente* and *légale* population is often confusing, as the French census gives tables sometimes in one, sometimes in the other, form. The official distinction is as follows:

'Les habitants sont ainsi comptés dans la commune où ils se trouvaient le jour du recensement. La population présente correspond donc à une situation de fait, saisie à un instant déterminé, tandis que la population légale correspond à un état habituel. L'écart entre la population légale et la population présente représente la balance entre le nombre de personnes ayant en France leur résidençe habituelle, mais se trouvant à l'étranger le jour du recensement (voyageurs, militaires, marins, etc.) et le nombre de personnes résidant hors de France et se trouvant momentanément sur le territoire français le jour du recensement. En fait, cet écart, se trouve augmenté par suite de l'imperfection des opérations.' See also p. 80.

This large influx of foreigners has served to offset the low natural rate of increase in France. Since 1911, the volume of immigration has greatly exceeded the excess of births over deaths (see p. 39). During the period 1850–1930, the excess of births was only about 2 million, while net immigration supplied France with some 3½ million people.

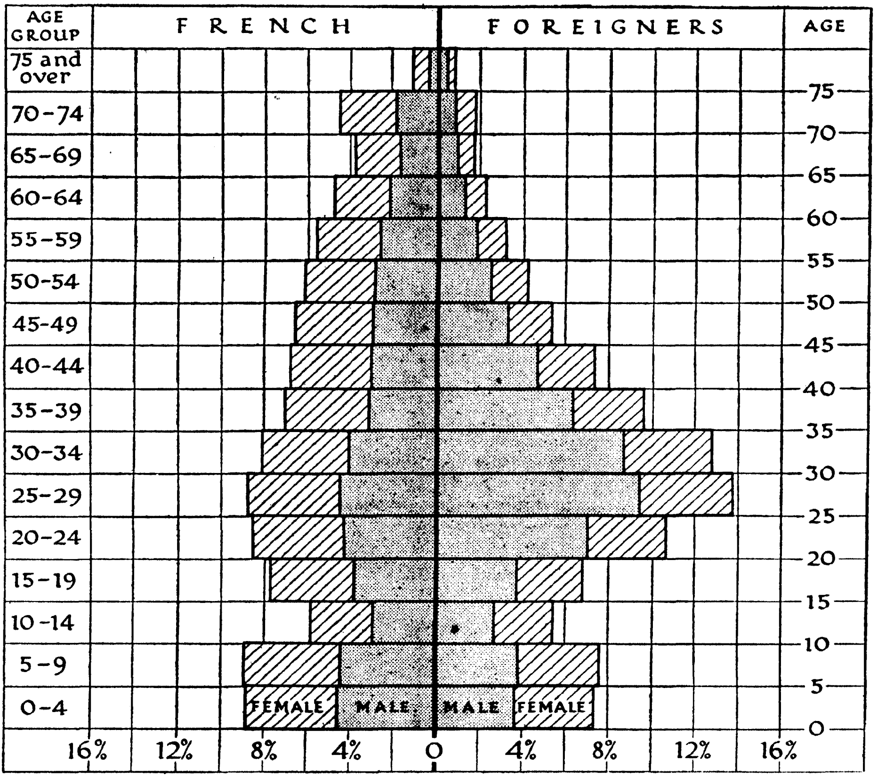

Fig. 103. The percentage distribution by age groups and sex of French nationals and foreigners in France, 1931

Several features are prominent: (*a*) The high percentage of foreign males between 20 and 40, and especially between 25 and 30. (*b*) The high percentage of foreign males compared with foreign females. (*c*) The effects of the war of 1914–18 are shown in the reduced French male age groups 35–59, which in 1914 formed the generation aged 18–42. A direct result of this is the decline in the age groups from 10–19.

Based on the French Census of 1931. The corresponding figures for the 1936 Census are not yet available.

The foreigners differed from the French population not only ethnically, but also from the point of view of their sex ratio, their age groups and their occupations. The most noticeable feature was the predominance of the masculine element. In 1931, males constituted 61 % of the foreign element, while the corresponding figure for the

French population was only 47 %. This numerical inequality of the sexes varied with the age groups. The predominance of men was particularly marked between 20 and 40, as Fig. 103 shows. Moreover, this age group as a whole (both men and women) was relatively much more numerous among foreigners than among the French. The difference reflected the heavy losses in the war of 1914–18, and indicated the economic role played by immigrant labour.

Of the 2,891,168 foreigners in France in 1931, some 1,600,000 were wage earners. Nearly one-half of these were employed in manufacturing industries; then followed agriculture with 16 %, mining and quarrying with 10 %, commerce with just under 10 %, transport, etc., with nearly 5 %, domestic service with 4 %, public services with 3 %, and, finally, the liberal professions with only 2 %. The contribution of these categories to French economy is summarized below:

Foreign (présente) *Working Population*, 1931

Category	Total working population	Foreign working population	% of foreigners	% of foreigners, 1906
Fishing	66,747	596	0·9	0·6
Agriculture and forestry	7,637,433	249,646	3·3	0·8
Mines and quarries	440,677	166,577	37·8	6·8
Manufacturing and building	6,837,684	782,637	11·4	4·8
Transport, etc.	1,069,356	76,211	6·9	5·2
Commerce, banking	2,695,390	156,001	5·5	4·4
Liberal professions	657,757	42,360	6·4	4·5
Domestic service	893,376	69,027	7·7	6·8
Public services	1,313,415	56,169	4·3	0·1
Total workers	21,611,835	1,599,224	7·4	2·9
Total population	41,228,466	2,714,697	6·0	2·5

From (1) *Recensement général, 1931*, vol. 1, pt. 5, p. 52 (Paris, 1936); (2) *Annuaire Statistique, 1938*, p. 103 (Paris, 1939).

These statistics understate the foreign element in the population of France, for they do not take account of the naturalized population, nor of those who have become French though born of foreign parents in France.* In 1889, the formalities attendant upon naturalization were reduced, and the number of naturalizations increased greatly. Here was one method of helping to combat the low birth-rate, and subsequent modifications of the law made naturalization increasingly easy.* After the modification of 1927, especially, the increase in the naturalized population was particularly marked (Fig. 105).†

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* Here, for example, are the regulations concerning a legitimate child born in France: (1) He (or she) is French if he is the son of a French father, of a French mother or of a father born himself in France. (2) He is French, unless he repudiates this nationality in the year following his majority, if he is born of a foreign mother, herself born in France. (3) He can become French, until he is 21 years old, if he was born in France of a foreigner and is domiciled in France, and if he claims French nationality. (4) He becomes French at 21, unless he repudiates this nationality, in the year following his majority, if he is domiciled in France and was born in France of foreign parents. See H. Ulmer, 'Structure humaine [française]', *Revue d'Economique politique*, vol. LIII, p. 23 (Paris, 1939).

IMMIGRATION AFTER 1918

During the nineteenth century this influx of immigrants was a spontaneous movement of those who came to avail themselves of the opportunities that France offered in the form of higher wages and political freedom. France, too, with her low birth-rate, had need of them. At the beginning of the twentieth century, French employers, believing in a shortage of labour and noting a slight decline in the annual volume of immigration, undertook to stimulate and organize the inflow of foreigners. Industrialists paid attention to the problem as early as 1900, but it was not until 1911 that an effective recruiting service was established by the *Comité des Forges* to introduce Italian workers. In the meantime, French agricultural societies had sought to encourage the immigration of Polish workers.

With the war of 1914–18, the demand for labour greatly increased, and in 1916 the Ministries of Labour and Agriculture undertook to recruit foreign labour. By the end of 1918, some 450,000 workers had been introduced, one-half of whom came from European countries and the other half from Africa and Asia. At the close of the war there was a shortage of labour in the boom years of the post-war period, and more workers were sought in foreign countries with unemployment. The French government collaborated with industrialists and agriculturalists; recruiting services were expanded, and conventions and treaties were made with foreign governments‡ to protect the interests of their respective nationals who came to work in France. The total number of immigrants and their occupational composition were regulated so as to prevent the overcrowding of the

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* (1) *Nouveau Petit Larousse* (Paris, 1933), p. 691, declares that the following groups can obtain French naturalization: (1) Foreigners who have received an official permit to fix their domicile in France, and have lived three years in the country. (2) Foreigners who can prove that they have resided for an unbroken period of ten years either in France or abroad as government officials. (3) Foreigners permitted to reside in France, after one year, if they have performed special services to the state in agriculture, industry or military affairs. (4) Foreigners who have been married to French citizens are accorded nationalization by decree after one year.

† Legislation under the Vichy regime, however, has revoked naturalization in many cases.

‡ Austria, Belgium, Czechoslovakia, Greece, Italy, Luxembourg, Poland, Romania, Spain, Yugoslavia.

French labour market with any one type of labour. There was a preliminary selection in the workers' country of origin, with a medical examination and tests of capacity. Upon arrival at the frontier control stations, a further medical examination was conducted (see vol. II, p. 239), and the accepted workers were set en route for the scene of their labours.

Aided by this recruiting, an enormous influx came into France after 1920. In 1910, of all the foreigners resident in seventeen countries in Europe, France had possessed 27 %, Germany 26 % and Switzerland 13 %. By 1930, these percentages had become 46, 14 and 7 respectively. Already by 1926 France was second to the U.S.A. as a home for immigrants. Indeed, in proportion to its population, France was the foremost country of immigration in the world, with 515 immigrants for every 100,000 inhabitants as compared with 492 in the U.S.A.

Immigration into France, 1922–38

Year	Arrivals	Departures	Net immigration
1922	181,652	50,309	+131,343
1923	262,877	59,951	+202,926
1924	265,355	47,752	+217,603
1925	176,261	54,393	+121,868
1926	162,109	48,683	+113,426
1927	64,325	89,982	− 25,657
1928	97,742	53,759	+ 43,983
1929	179,321	38,870	+140,451
1930	221,619	43,789	+177,830
1931	102,267	92,916	+ 9,351
1932	69,492	108,513	− 39,021
1933	74,635	49,047	+ 25,588
1934	71,538	40,004	+ 31,534
1935	56,506	67,215	− 10,709
1936	40,990	46,426	− 5,436
1937	67,905	20,527	+ 47,378
1938	46,090	20,519	+ 25,571
Totals	2,140,684	932,655	+ 1,208,029

From successive *Annuaires Statistiques* (Paris).

This enormous influx after the war of 1914–18 was not the result of a regular and continuous movement, but was marked by considerable fluctuations due to economic and political factors. Thus both in 1921 and 1927 the number of immigrants fell considerably owing to the economic crises of those years. The above table summarizes conditions during 1922–38. These returns were influenced by the fact that many workers remained only for a season and re-entered the country year after year. Some industries (e.g. building, electro-chemical) had a seasonal rhythm and were fed by temporary foreign labour.

This was also a special feature of some types of agriculture. Before the war of 1914–18, the number of seasonal agricultural workers was about 90,000. By 1931, the number had fallen to about 40,000. It was this decline that obliged agriculturalists to utilize organized immigration, and it explains in part the rise of the Polish element in France. The seasonal agricultural workers consisted mainly of Belgians (20,000), Spaniards (15,000) and Italians (6,000), and they were mainly employed in harvesting sugar beet and in grape picking.

In addition to these immigrants, some 58,000 foreign workers crossed the frontier, in 1931, each day to work in France, but this was offset by the fact that 22,000 people residing in France worked outside France.

With the increase of cyclical unemployment after 1930, some publicists, politicians and administrators became increasingly hostile to foreign labour. They even advocated the revocation of the treaties made with the emigrant countries, and they declared the immigrants to be 'robbers of national labour', docile, willing to work for low wages and disinclined to join labour unions. Others, on the other hand, emphasized the contribution made by the immigrants towards redressing the low birth-rate in France, especially in a period of industrial expansion. These asserted that the immigrants did not compete to any appreciable extent with French labour, but undertook types of work disliked by the French, and took the place of French workers 'who had not been born'. Moreover, it was obvious that from a military point of view, the value of an increase in French man-power through the possibility of assimilation was important.

The net result of the hostility, however, was a law in 1932 designed to protect the home market for French labour. The number of working permits for foreigners was limited and the number of jobs available was controlled by decrees fixing, by occupation and district, the relative numbers of foreigners that might be employed. The effect of these various checks was to reduce the foreign population, and between 1931 and 1936 the number of foreigners fell by 437,661. The need for some revision of this anti-immigrant policy became quickly apparent towards the end of 1936, when it was found that the available supply of skilled native workers was not sufficient to meet the greater demand arising from the adoption of a 40 hr. week (instead of the previous 48 hr.) in industry and commerce, and of 38 hr. 40 min. (as from September 1936) in the mines. Henceforward there was a certain degree of relaxation in the application of the foreign labour regulations.

The objection to the foreign element after 1930 was not only economic but political. An important feature of the foreign settlement was its uneven distribution over the country (Fig. 104). Those foreigners who did not feel the pull of Paris tended to settle along the frontier nearest to their country of origin, though there were some exceptions, e.g. in the industrial regions around Lyons and in the agricultural department of Lot-et-Garonne where depopulation had been considerable (see p. 56). In 1936 seven departments contained about one-half of the total foreign *légale* population in France:

Department	1931		1936	
	Total foreign population	% of total population of department	Total foreign population	% of total population of department
Seine	459,498	9·6	369,317	7·4
Bouches-du-Rhône	248,800	22·6	245,375	20·0
Nord	222,247	11·0	171,343	8·5
Pas-de-Calais	173,525	14·4	135,885	11·5
Alpes-Maritimes	140,466	28·6	113,604	22·2
Seine-et-Oise	122,447	9·0	92,946	6·5
Moselle	130,095	18·8	91,101	13·1

This and the table below are from (1) *Recensement général, 1931*, vol. 1, pt. 1, pp. 108–9 (Paris, 1933); (2) *Annuaire Statistique, 1938*, p. 3 (Paris, 1939).

In some of the less densely populated departments also, the foreign element attained considerable proportions, as the following table shows:

Department	1931		1936	
	Total foreign population	% of total population of department	Total foreign population	% of total population of department
Alpes-Maritimes	140,466	28·6	113,604	22·2
Bouches-du-Rhône	248,800	22·6	245,375	20·0
Pyrénées-Orientales	37,339	15·8	42,649	18·5
Moselle	130,095	18·8	91,101	13·1
Aude	40,330	13·6	36,397	12·6
Lot-et-Garonne	22,246	9·0	29,956	11·9
Var	52,949	14·1	46,534	11·8

This uneven distribution meant that foreigners dominated certain localities, and formed compact groups which were almost impervious to French language and culture. These foreign groups had their own newspapers and organizations and sometimes maintained formal connexions with their own countries. They often arrived in family groups or in bands with a leader who carried out all negotiations. Some stayed only a few years; but even when permanent settlements were formed, these tended to retain their group character. Assimilation became increasingly difficult with the increased consciousness of nationality that has been such a feature of twentieth-century Europe. Against this must be set the efforts of French education to facilitate assimilation, and the assimilative ability of the French people has often been stressed. The opening of foreign schools was prohibited by French law; all that the immigrants were able to do was to open a few independent schools (subject to French control), and some crèches, social clubs, evening classes, libraries, etc.

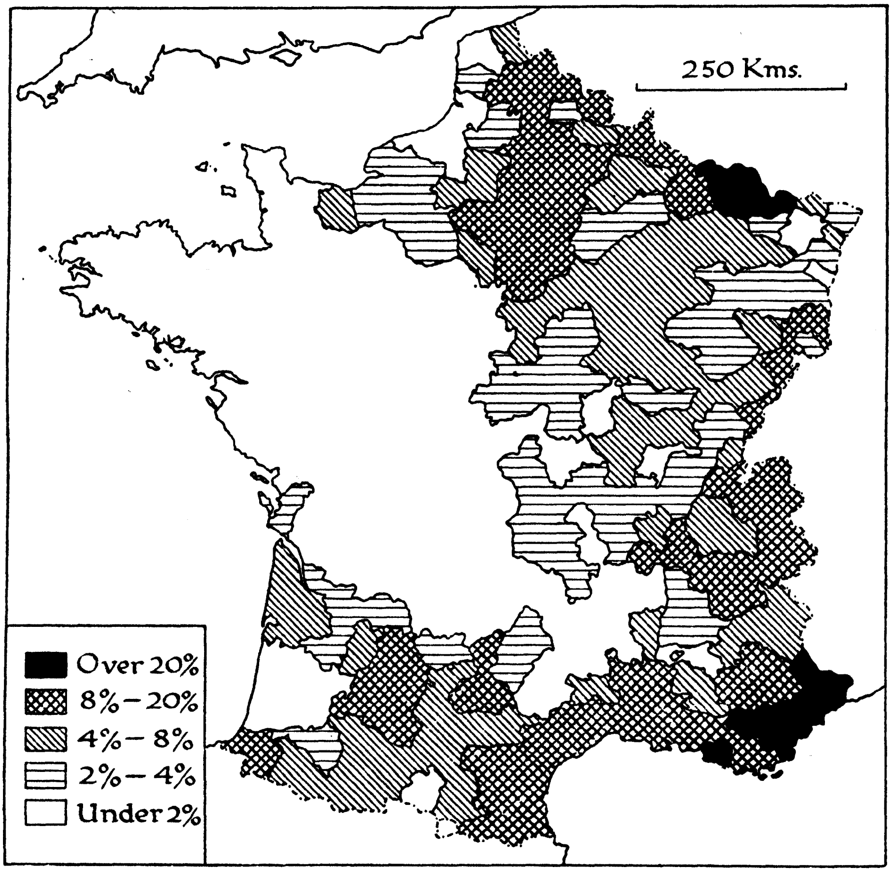

Fig. 104. The distribution of the foreign population in France, 1931

Based on the *Atlas de France*, Plate 78 (Paris, 1933). This is calculated on the basis of *arrondissements*. Percentages of the total population are given.

Some private Italian schools, opened in contravention of the law, were closed by order of the French authorities. The Poles alone succeeded in obtaining permission to teach in private schools (see vol. II, p. 224). In this connexion it is interesting to note that in 1926 some 14 % of the foreign element was illiterate, while the corresponding figure for the French population was only 5 %.

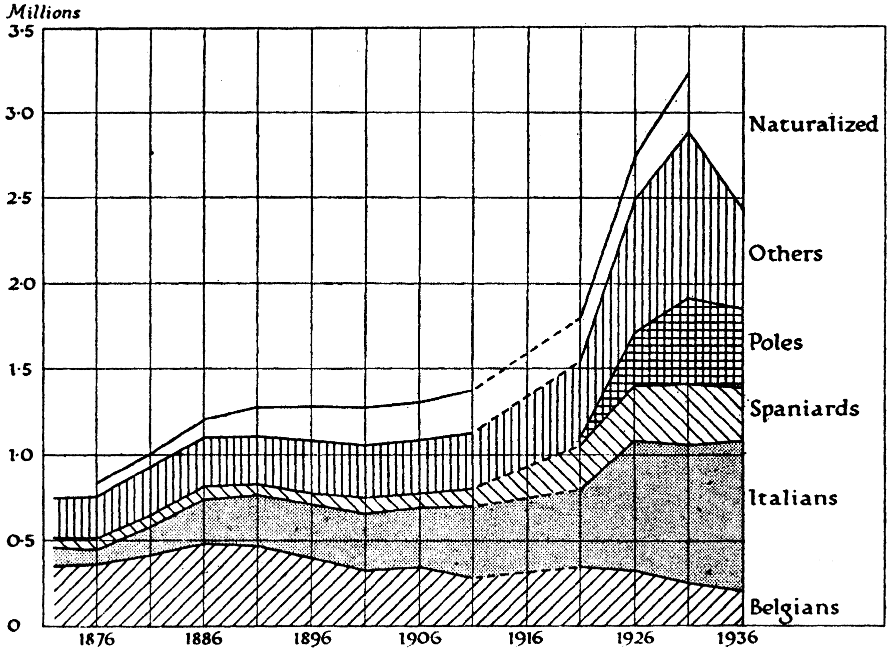

Fig. 105. The growth of the main foreign elements in the population of France, 1872–1936

The following points are to be borne in mind: (*a*) The first census shown on the graph was in 1872 because of the Franco-Prussian war. (*b*) No census was held in 1916 because of the war of 1914–18. (*c*) Statistics for 'naturalized' foreigners were first issued for 1876; the figure for 1936 is not yet available. (*d*) Poles were classified separately for the first time in 1921; previously they had been included under 'Others'.

Based on G. Mauco, *Les Etrangers en France*, p. 146 (Paris, 1932), brought up to 1936 from the French Census returns for 1931 and 1936.

The national composition of the foreigners did not remain uniform during this period of influx (Fig. 105). Up to the middle of the nineteenth century, Belgians constituted one-third of the total number of foreigners in France; next in order of importance came Italians and Germans. After 1880, however, Italians entered in greater numbers, and by 1911 they had become the most numerous foreign element in France, and so they remained in 1936. Spaniards, too, became increasingly numerous in the twentieth century. From 1919 onwards, a new current began to flow, this time from central and eastern Europe. Poles, who in 1921 formed only 3 % of the foreigners in France, had risen to 18 % in 1931. The numbers of Asiatics and Africans (mainly North Africans) also increased very considerably. The situation from 1926 to 1936 is summarized in the adjoining table of *présente* populations. From this it will be seen that by far the most important elements were Italian, Pole, Spaniard and Belgian. Together they constituted three-quarters of the total foreign population of France.

For the arrival of foreign refugees in France both before and after 1936, see p. 392.

Foreign population (présente) *in France*, 1926–36

Nationality	Census March 1926	Census March 1931	At 31 December 1936
Italian	760,116	808,038	876,823
Polish	309,312	507,811	463,143
Spanish	322,590	351,864	317,806
Belgian	326,654	253,694	211,484
Swiss	123,119	98,475	88,880
Russian	67,218	71,928	63,349
Armenian	*	29,227	51,149
German	69,278	71,729	49,786
Czechoslovak	32,989	47,401	41,474
Portuguese	28,883	48,963	38,472
British	62,298	47,322	31,930
Yugoslav	15,138	31,873	25,668
Greek	18,588	19,123	21,272
Turkish	26,076	36,119	18,086
Luxembourger	28,270	21,286	15,303
Romanian	13,249	15,387	13,452
Hungarian	13,417	18,824	12,240
United States	17,966	16,819	11,467
Dutch	10,534	9,897	8,276
Austrian	5,294	9,780	7,603
Scandinavian	7,127	7,245	6,018
South American	10,691	11,009	5,212
Bulgarian	2,606	4,542	3,180
Other foreigners	61,317	74,372	59,660
French colonials and protected persons	76,613	101,969	125,000†‡
Total foreigners	2,409,333	2,714,697	2,566,733†
Total French	38,334,562	38,513,769	38,660,267†
Total population	40,743,895	41,228,466	41,227,000†

* Not separately distinguished in 1926. † Estimated.

‡ Mainly North Africans.

From official sources and on the *Recensement général, 1931*, vol. 1, pt. 1, p. 81 (Paris, 1935).

Italians in 1931

The presence of Italians in the border regions of south-eastern France was a long-standing feature which the acquisition of the Alpes-Maritimes in 1860 greatly accentuated (Fig. 106). In 1931, they were numerous in all the south-eastern departments, but they were most thickly settled in two areas that reflected the ways by which they entered France. One was the belt of three departments along the Mediterranean coast—Alpes-Maritimes, Var and Bouches-du-Rhône. Italians became prominent in the agriculture of the area, and worked in vineyards or became market gardeners and florists. This agricultural element was considerably supplemented by workers engaged in quarrying, building and road making, and there was also a very considerable Italian population in Marseilles. The second belt in the south-east extended eastwards from Lyons and included the departments of Isère, Savoie and Haute-Savoie. Here, the immigrants came across the cols of the Alps and down the valleys of the Isère and the upper Rhône. The development of hydro-electric power and the growth of associated chemical and metallurgical industries since 1920 led to increasing immigration, and the Italian population of these departments more than doubled between 1911 and 1926.

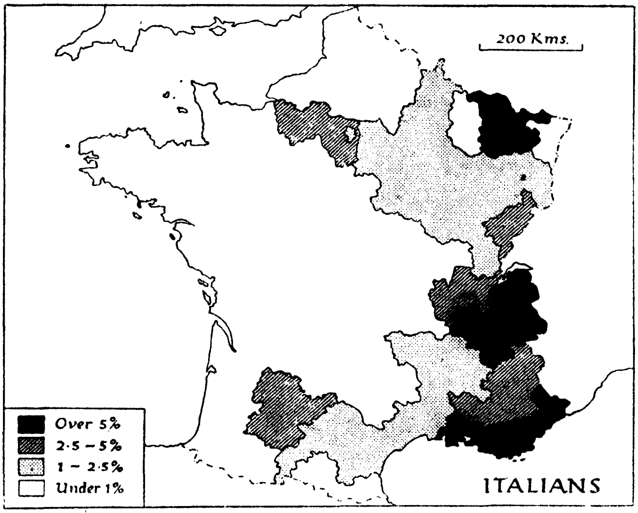

Fig. 106. The distribution of Italians, 1931

Based on the French Census of 1931, and calculated on the basis of departments. Percentages of the total population are given.

An even more striking feature after 1920 was the spread of

Italians beyond the frontier region of the south-east. With the development of organized immigration they settled over a very much wider area—in the big industrial centres and in regions of great rural depopulation. There was an important Italian element in Lorraine, in the departments of Meuse, Moselle and Meurthe-et-Moselle, notably in the basins of Briey and Longwy, where they were engaged in mining and in metallurgical work. Many came also to take part in the reconstruction of the north-east after the devastation of 1914–18. Others were absorbed by the growing industries of Normandy, of the centre and of Burgundy. Another group was to be found in the south-west where they settled in the depopulated departments of Gers, Haute-Garonne, and Lot-et-Garonne (see p. 56); here the number of Italians rose from 390 in 1911 to 30,812 in 1931. Finally, the number of Italians in and around Paris (the departments of Seine and Seine-et-Oise) considerably more than doubled itself in 1911–31.

The main facts of their distribution are summarized in the following table which shows the changes between 1911 and 1931 in the twenty departments where Italians were most numerous in 1931:

Italian population (présente), 1931

Department	1911	1926	1931	% of total population 1931
Seine	45,600	99,704	102,764	0·20
Alpes-Maritimes	87,556	104,419	99,600	20·22
Bouches-du-Rhône	114,635	110,651	93,165	8·46
Meurthe-et-Moselle	25,130	47,046	45,965	7·75
Var	42,403	47,207	37,919	10·58
Seine-et-Oise	4,461	22,330	39,513	2·88
Isère	9,585	31,830	37,605	6·43
Moselle	*	31,945	36,011	5·19
Rhône	12,631	28,489	28,787	2·75
Savoie	8,990	14,981	16,604	7·03
Haute-Savoie	3,016	9,529	13,258	5·28
Lot-et-Garonne	112	7,594	12,081	2·46
Loire	3,470	11,503	11,036	1·67
Nord	1,240	9,747	10,658	0·52
Haute-Garonne	234	6,776	10,237	2·32
Haut-Rhin	*	6,765	9,900	1·91
Gard	3,016	8,307	9,704	2·38
Doubs	2,467	7,575	9,254	3·03
Ain	3,677	7,525	8,692	2·75
Gers	42	6,383	8,494	4·3
France	419,234	760,116	808,038	1·96

* From 1871 until 1919 these departments formed part of Germany.

From the *Recensement général, 1931*, vol. 1, pt. 2, pp. 110–13 (Paris, 1935). Figures for 1936 not yet available.

In 1931, the Italian working population numbered some 475,000. Of these 70,000 were engaged in agriculture and 280,000 in industry; some 30,000 of the latter were employed in metallurgy. Among other activities, 90,000 were employed in the building trade, and 25,000 in mines and quarries.

The Italian government created an official department to deal with the problems of emigration, and it was particularly active in keeping alive the loyalty of Italians abroad. Subsidies were given to cultural and sports organizations which helped to maintain the national spirit amongst Italians in France. Campaigns were conducted against assimilation, and every year the delegates of the Federation of Italian Associations in France held a general meeting. The majority of these organizations were under the supervision of consular and other official agencies. Italian propaganda was carried on throughout France by the 'Opera Bonomelli', a religious and social welfare organization subsidized by the Italian government. It became too active politically and was dissolved in 1929, and replaced by the Association of Italian Catholic Missionaries. At home, the Italian government energetically impressed upon would-be emigrants the necessity for remaining Italian. Finally, the emigration of Italian agricultural workers was prohibited 'on account of its settled character' and the danger of assimilation into France. The emigration of women and of the families of emigrants was also restricted lest they should encourage the permanent settlement of Italians in France.

For Italian refugees, see p. 393.

POLES IN 1931

The increase of Polish immigration was one of the outstanding trends in France after the war of 1914–18, and Poles did much towards the reconstruction of the north-east (Fig. 107). The comparison of the figures for 1931 with those for 1921 (in default of any for 1911) showed an enormous increase of Poles in departments of Pas-de-Calais and Nord, where their numbers rose from 5,000 to 140,000 in five years. The figures for other departments of the north-east were likewise striking. Poles also came to the growing industries of Normandy, and the number in and around Paris likewise greatly increased (the departments of Seine and Seine-et-Oise). Some Poles reached southern France and were to be found more particularly to the west of Lyons. Farther south still, Polish settlers were sent to people deserted farm areas in the Tarn-Garonne area (see p. 56); thus, near Toulouse, a single union of Polish settlers succeeded in reclaiming some 500 abandoned farms.

The main facts of their distribution are summarized in the following table, which shows the changes between 1921, the first year in which Poles were separately distinguished, and 1931 in the thirteen departments where Poles were most numerous in 1931:

Polish population (présente), 1931

Department	1921	1926	1931	% of total population 1931
Pas-de-Calais	3,370	90,996	115,264	9·56
Nord	1,320	49,581	76,444	3·27
Seine	14,800	31,844	50,598	1·02
Moselle	5,640	20,755	38,018	5·49
Meurthe-et-Moselle	2,930	12,121	27,130	4·57
Seine-et-Oise	600	7,542	19,640	1·44
Aisne	1,040	9,924	16,922	3·46
Seine-et-Marne	360	5,472	13,303	3·28
Saône-et-Loire	1,578	9,592	12,605	2·34
Haut-Rhin	615	3,450	11,132	2·15
Oise	870	6,579	10,894	2·67
Loire	2,550	5,912	9,287	1·39
Somme	527	4,185	5,910	1·27
France	45,766	309,312	507,811	1·24

From the *Recensement général, 1931*, vol. 1, pt. 2, pp. 110–13 (Paris, 1935). Figures for 1936 not yet available.

They were employed mainly in the unskilled occupations. In 1931, the Polish working population numbered some 287,000. Of these 50,000 were engaged in agriculture and 110,000 in industry; some 19,000 of the latter were employed in metallurgy and 12,000 in textiles. Among other activities, 96,000 were employed in mining and quarrying.

Poland followed the same policy as Italy but with less vigour. In 1910 she created a Central Office for Emigration to supervise the interests of her nationals abroad, and in France the Polish element offered strong resistance to assimilation, for the majority regarded their stay abroad as but temporary. In 1939, some 100,000 Poles belonged to local units federated in a Union of Poles in France with its headquarters at Lille. The aim of this union was the furthering of cultural and national ideas—by means of local social clubs, libraries, folk theatres, choirs, orchestras, lecture tours, sports, etc. Moreover, of all foreign groups, only the Poles succeeded in obtaining from their employers the building of private schools with Polish pupil teachers who, for one-half of the time-table, taught the language, history and geography of Poland. It was estimated that out of 60,000 children of school age, about 32,000 obtained some teaching in Polish. A special achievement in the cultural field was the founding in 1924 of a workers' university in Lille, which aimed at providing courses of all kinds for adults. Contrary to the hope of the French authorities, the Poles proved difficult to assimilate, and the majority kept in mind the prospect of returning home.

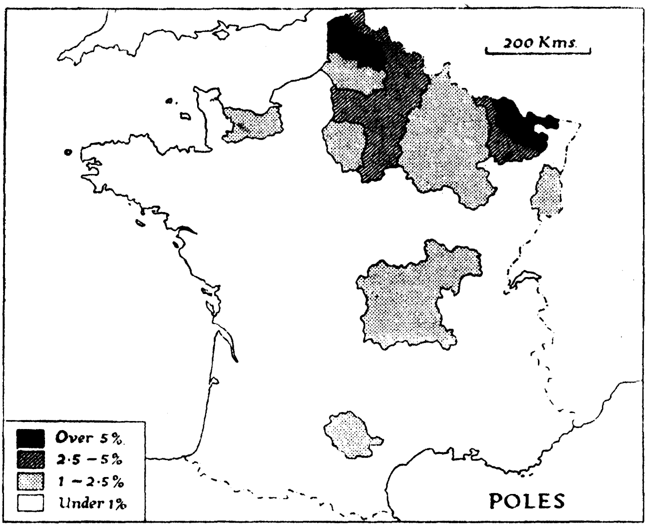

Fig. 107. The distribution of Poles, 1931

Based on the French Census of 1931, and calculated on the basis of departments. Percentages of the total population are given.

SPANIARDS IN 1931

Like Italians and Belgians, Spaniards were mainly to be found in the parts of France that adjoin their own frontiers (Fig. 108). They were particularly numerous in the three wine-growing departments of Hérault, Aude and Pyrénées-Orientales, where the Spanish population trebled in 1911–26. To the west, the Spanish element was less dense and more dispersed, but there always were important groups in the towns—Bordeaux, Toulouse, Carmaux, Agen, etc. A new feature after 1920 was the appearance of Spaniards in the industrial area around Lyons; in the Rhône department they rose from 897 to 13,054 between 1911 and 1926, while in Loire the increase was even more remarkable—from 371 to 7,598. Some Spaniards also reached the industrial areas of Paris and the north-east.

The main facts of their distribution are summarized in the following table, which shows the changes between 1911 and 1931 in sixteen departments where Spaniards were most numerous in 1931:

Spanish population (présente), 1931

Department	1921	1926	1931	% of total population 1931
Hérault	12,501	43,424	51,423	9·98
Seine	7,640	28,207	31,547	0·60
Aude	8,610	25,606	29,098	9·80
Pyrénées-Orientales	12,575	28,613	25,332	10·60
Bouches-du-Rhône	6,847	21,327	22,115	2·00
Gironde	6,558	20,514	21,346	2·50
Rhône	897	13,054	17,590	1·68
Basses-Pyrénées	17,442	19,616	17,571	4·15
Gard	1,190	9,340	13,907	3·42
Haute-Garonne	5,797	12,151	13,565	3·07
Isère	260	5,861	9,458	1·62
Tarn	684	6,972	8,420	2·78
Loire	371	7,598	7,517	1·13
Hautes-Pyrénées	3,542	6,152	6,885	3·62
Aveyron	950	5,826	6,626	2·05
Ariège	1,011	4,472	5,103	3·16
France	105,760	309,312	351,864	0·85

From the *Recensement général, 1931*, vol. 1, pt. 2, pp. 110–13 (Paris, 1935). Figures for 1936 not yet available.

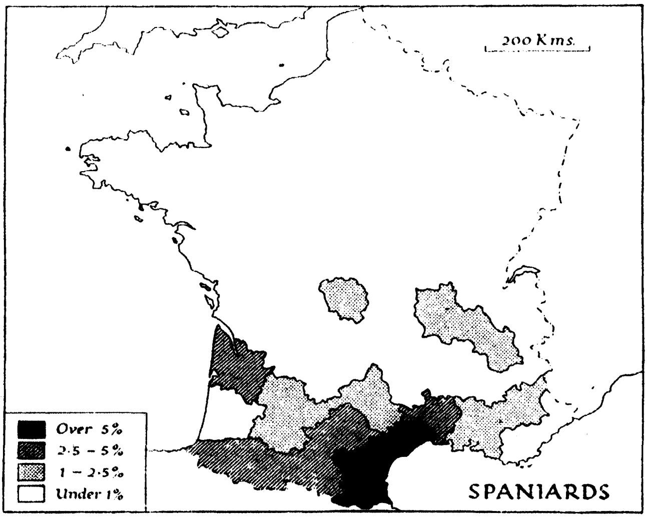

Fig. 108. The distribution of Spaniards, 1931

Based on the French Census of 1931, and calculated on the basis of departments. Percentages of the total population are given.

In 1931, the Spanish working population numbered some 194,000. Of these 57,000 were employed in agriculture and 84,000 in industry. The rest were engaged in miscellaneous industries, e.g. fishing, mining, domestic service.

Spain, like Italy, restricted emigration as much as possible, and, to some extent, legislated against attempts to recruit her labour. She was also concerned to develop patriotic sentiments and solidarity amongst Spaniards in France, but this work was not as active as that among the Italian settlers.

For Spanish refugees, see p. 395.

BELGIANS IN 1931

The main area settled by Belgian immigrants was the French industrial district close to the Belgian frontier (Fig. 109). Ten northern departments contained 80 % of the Belgian total in France. Since 1918, however, a striking feature had been some reduction in the number of Belgians in the departments immediately adjoining their homeland (Nord, Ardennes, Meurthe-et-Moselle), and a spread towards the interior, notably towards Normandy (Eure, Seine-Inférieure). The development of agricultural colonization after 1920 was the main explanation of this extension. A number of Belgians, however, even reached the new industries in the Alpine districts.

The main facts of their distribution are summarized in the following table which shows the changes between 1911 and 1931 in the eleven departments where Belgians were most numerous in 1931:

Belgian population (présente), 1931

Department	1911	1926	1931	% of total population 1931
Nord	169,080	137,124	99,432	4·90
Seine	33,690	44,508	34,778	0·61
Pas-de-Calais	19,580	22,298	14,735	1·23
Seine-et-Oise	5,690	13,769	12,025	0·88
Ardennes	17,349	16,129	11,572	3·95
Oise	7,281	12,021	10,157	2·49
Aisne	4,880	11,407	9,848	2·01
Somme	2,599	6,885	6,066	1·30
Seine-et-Marne	2,890	6,032	5,132	1·17
Meurthe-et-Moselle	8,675	6,776	5,030	0·85
Seine-Inférieure	1,309	5,741	4,651	0·51
France	287,126	322,520	253,694	0·61

From the *Recensement général, 1931*, vol. 1, pt. 2, pp. 110–13 (Paris, 1935). Figures for 1936 not yet available.

In 1931, the Belgian working population numbered some 156,000. Of these, 35,000 were employed in agriculture and 78,000 in industry; some 26,000 of the latter were engaged in metallurgy and 16,000 in textiles. Among other activities, 18,000 were employed in domestic service and 15,000 in the building trade.

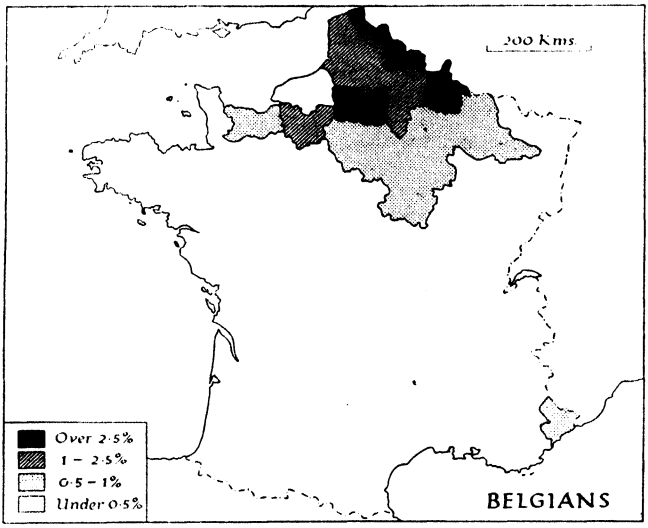

Fig. 109. The distribution of Belgians, 1931
Based on the French Census of 1931, and calculated on the basis of departments
Percentages of the total population are given.

The Refugee Problem

After the war of 1914–18, France became the main country of refuge in western Europe, and the figures of foreign population in the censuses of, say, 1931 and 1936 included many political refugees who for various reasons had found it necessary to leave their homeland. Some were of comparatively long standing and had come in the early twenties; others arrived more recently as a result of conditions in Italy, Germany and, above all, Spain. Taken together, they comprised a wide variety of nationalities—Russians, Armenians, Italians, Germans (and Saarlanders), Spaniards, Georgians, Assyrians, Assyro-Chaldaeans and Turks. It is difficult to separate this political element from what might be termed the 'normal' economic influx of those who arrived in France simply to earn a living. Despite the French tradition of the 'droit d'asile', the presence of these foreigners caused occasional outbursts of xenophobia in some circles, notably during the years 1934–5, 1937 and 1939–40 (see p. 380). These outbursts culminated in the anti-Jewish legislation which the Vichy government passed under Nazi pressure. It must be emphasized that estimates of the number of political refugees vary considerably because of the large number of illegal entries and because of the difficulties of registration. Conditions up to June 1939 are described in two authoritative surveys by Sir John Hope Simpson—*The Refugee Problem* (Oxford, 1939) and *Refugees* (Oxford, 1939). This account is based to a large extent on these two sources.

Hope Simpson estimated that the 2½ million foreigners in France in 1936 included 170,000 refugees. By June 1939, both figures had become very much bigger, because the whole refugee situation had been changing with the development of Fascism in Italy, with the rise of Hitler in Germany, and, above all, with the Spanish civil war. Hope Simpson's estimate of the refugee population, as distinct from other foreign residents, in June 1939, was as follows:

Spaniards	350,000	Central Europeans	45,000
Russians	71,500	Italians	30,000
Armenians	63,000	Saarlanders	4,000

Thus, while the Italian refugees were only a small fraction of the total Italian population, the Spanish newcomers exceeded the number of Spanish residents already in the country. This influx resulted in enormous legal and administrative complexities, and a Co-ordinating Committee was established under the French Minister of Foreign Affairs to deal with the problems that were raised, and to negotiate with government departments.

Italian Refugees

The rise of Fascism in Italy from 1925 onwards meant that many people either left the country of their own accord or were obliged to leave. Estimates of their numbers vary a great deal, but Hope Simpson's estimate of the number who could not return to Italy in 1937 was 10,000, or, if dependents were included, 30,000. This was a small total compared with the main body of Italians in France. The refugees joined various anti-Fascist organizations which aimed at counteracting the propaganda of the Italian government in France (see p. 387), and at fostering relations between the refugees and the other Italian immigrants. The Italian armistice of June 1940, unlike the German, did not require the handing over of any refugees (see below).

German Refugees

With the rise of Hitler to power in Germany in 1933–4, France provided a nearby home for refugees from the new regime. Estimates of the number in France at the end of 1933 varied between 25,000 and 60,000. Later estimates were equally conflicting, and probably no accurate figure is possible owing to the large number of illegal entries across the frontier or through Luxembourg and Belgium. For most of the refugees France was but a temporary home. They moved on to other countries. Hope Simpson estimated that at the end of 1937 there were about 10,000–15,000 still remaining. After the annexation of Austria in March 1938, and with the more intensive persecution of Jews in Germany, the number increased. One estimate placed the number of Austrian refugees in France by the autumn of 1938 at 5,000–6,000. The occupation of Czecho-Slovakia (September 1938–March 1939) brought further refugees. Altogether by the middle of 1939, Hope Simpson declared, 'a reasonable guess' at the number of refugees from Greater Germany 'at any one time may be 40,000'.

It is interesting to note that the Census figures show fewer Germans in France in 1936 than in 1931. It is possible that those German residents in France who favoured the new regime had returned and so balanced the exodus from Germany, or that many Germans had taken French nationality. No certain figures are available about the number of refugees from Czecho-Slovakia, but it is unlikely that many of the 40,000 Czecho-Slovaks recorded in the Census of 1936 could return to their homes after the events of 1938–9.

At the outbreak of war in September 1939, various precautions were taken, and large numbers of German and Austrian male refugees were interned in camps. The large total of foreign Jews who had taken refuge in France up to September 1939 was further swollen by the arrival of some thousands from Holland, Belgium and Luxembourg (see vol. II, p. 34). According to the armistice of June 1940, the Vichy government was to deliver 'on demand all German nationals specified by the government of the Reich'. It seems as if the French were reluctant to accept this clause, and there is no clear evidence of the number of political and Jewish refugees so delivered. Discrimination against Jews was introduced by the Germans in occupied France and then under Nazi pressure in the unoccupied zone (see vol. II, p. 36). In the summer of 1942, anti-

Semitic measures were increased, and many thousand non-French Jews, both from occupied and unoccupied France, were deported ostensibly to satisfy the demand for workers in Germany and beyond, but estimates of the exact number vary greatly; and the relation of this Nazi policy to that of extermination must also be borne in mind.

Spanish Refugees

The civil war in Spain that broke out in July 1936 led to considerable dislocations of population which were not confined to the peninsula, and from the early days of the war Spaniards fled into France by sea from the northern ports of Spain or across the high passes of the Pyrenees. By the autumn of 1937, the Spanish Consulate in Paris placed the number of refugees in France at about 145,000. The total number involved was far greater than this, for large-scale repatriations were taking place all the time; of the large numbers who had entered France, only about 40,000 remained by the end of the year. In 1938, however, further refugees came in. Thus during General Franco's advance in March–April, a wave of refugees came over high passes of the Pyrenees knee-deep in snow; some died or fell over the precipices, but 6,000 militiamen and 2,000 civilians reached Luchon after a journey which the local inhabitants had believed impossible at that time of the year.

With the beginning of General Franco's Catalonian offensive, in December 1938, there was a great movement towards the French frontier. Nearly 100,000 Spaniards were already collected in camps in France, when, in February 1939, it was known that some 300,000 refugees, soldiers and civilians, were crowded along the French frontier; many were dying of exposure or typhoid. By arrangement with the generals of the retreating Republican army, this great multitude was admitted into France, and its arrival was superintended by the French army. 'That there were no casualties reflects great credit on the French soldiers who carried out the difficult operation and on the refugees themselves' (Hope Simpson). The men were sent to camps under military discipline; the women were scattered throughout France in private houses, in camps, or in groups lodged in disused buildings. The material is not yet available for the full story of the horror to be told. The relief work of the French government itself was supplemented by that of the Red Cross Societies of many countries, but, even so, the hastily improvised camps and lodgings lacked equipment, clothing, bedding and medical supplies. The personal tragedies of the upheaval were many; families were separated, and children were lost, many of them too young even to know their own names.

At the close of the civil war in April 1939, the number of civil and military refugees in France was estimated at about half a million. Many of these subsequently returned to Spain or emigrated to Latin America; and by June 1939 the number that remained was assessed by Hope Simpson at 350,000. Their maintenance cost the French government about seven million francs a day. By the outbreak of war in September 1939, however, this number had been greatly reduced. Official figures supplied by M. Sarraut, the Minister of Interior, put the number in December 1939 at 140,000. The bulk were employed in factories, in agriculture or in labour battalions.

There was no reference to Spanish refugees in the armistice terms between France and Germany (June 1940). It soon became clear, however, that the position of the most active Republican partisans was precarious, but it is difficult to assess the number of refugees who have been returned to Spain through the agency either of the Vichy government or of German officials at Paris; possibly the figure runs to many hundreds. The agreement concluded on 23 August 1940 between the Vichy government and Mexico, under which all Spanish refugees in France since the civil war were to emigrate to Mexico, was not fulfilled, partly owing to lack of shipping; and Mexico and Vichy later broke off diplomatic relations. Some refugees were sent to North Africa, for labour on the Trans-Saharan railway, where they worked under terrible conditions. The rest remained in France. Estimates of their number vary greatly; according to one estimate made in June 1942, the majority of the 140,000 Spanish refugees who were in France at the end of 1939 seemed still to be there—that is, in addition to the 300,000 or so Spanish residents already in France in 1936. It is not clear what number may have been included in the Hitler-Laval scheme of providing labour in Germany in return for the release of French prisoners-of-war.

BIBLIOGRAPHICAL NOTE

1. The most complete survey of the problem up to 1932 is G. Mauco's *Les Etrangers en France* (Paris, 1932). This is a most exhaustive study well illustrated by maps and diagrams, and it contains a bibliography. It may be supplemented by a chapter on immigration in J. J. Spengler, *France Faces Depopulation* (Durham, North Carolina, 1938), and by a section in F. C. Wright, *Population and Peace*, pp. 159–67 (Paris, 1939).

2. The figures are obtained from the French Census—*Résultats statistiques du recensement général de la population*, published by the *Direction de la Statistique Générale et de la Documentation* (Paris). The latest detailed figures for the distribution of the various national elements are from the 1931 census, *Tome I*, 5^{e} *Partie*, *Etrangers et naturalisés*. For the 1936 Census itself, general totals only are available in *Tome I*, 1re *Partie*, as the succeeding volumes of detailed analysis have not yet been published.

3. For comparative purposes, the following is useful: *World Statistics of Aliens* (International Labour Office, Geneva, 1936).

4. The refugee problem is fully examined in two authoritative accounts by Sir John Hope Simpson: *The Refugee Problem* (Oxford, 1939) carries the story up to October 1938; *Refugees* (Oxford, 1939) brings it up to June 1939.

Appendix II

CHIEF TOWNS AND CITIES

In 1936, there were in France seventeen towns with a population exceeding 100,000. Seven of these towns are seaports, and they are not fully described in this Appendix apart from a summary account of their administrative importance. Fourteen other towns had a population ranging from 80,000 to 100,000; among them are Boulogne-Billancourt (97,379), a suburb of Paris, and Villeurbanne (81,322), which forms part of the Lyons conurbation. Excluding Paris, twenty-one inland towns are dealt with in the following accounts. Their location is shown on Fig. 25, and their regional distribution is described in Chapter 1.

AMIENS (pop. 93,773)

General Features

Amiens, chief town of the department of Somme and the seat of a bishopric, is situated in the wide chalk upland of Picardy, on the left bank of the river Somme which here turns north-west towards the English channel.

The older quarter of the city, dominated by the citadel on the hill rising to the north, is intersected by the many branches of the river. The town has expanded towards the flood-plain between the Somme and the Avre. New suburbs have arisen to the south beyond the old fortifications, which have now been replaced by boulevards, as well as along the slopes on either side of the citadel. Immediately outside the town there are market gardens (*hortillons*), reclaimed from peat bogs in the marshy valley. Traversed by canalized streams from the rivers, the *hortillons* are accessible only by flat-bottomed boats.

Amiens is the administrative centre of the Second Economic Region, formed by the Chambers of Commerce of Abbeville, Amiens, Péronne, St Quentin and Beauvais, and the headquarters of the Second Army Area are established here. It is also the seat of the Court of Appeal for the departments of Aisne, Oise and Somme. In recent years there have been proposals for the establishment of a university in the town.

History

In Roman times Amiens (Samarobriva) was the most important town of the Ambiani, and during the Middle Ages it formed part of the countship of Amiens. Its Gothic cathedral, the greatest of all French cathedrals (Plate 66), was begun in the thirteenth century (see vol. II, p. 66), and provides striking testimony to the medieval importance of the city. The dukes of Burgundy were in possession of the town for about fifty years during the fifteenth century. As capital of Picardy, Amiens was the seat of government throughout the seventeenth and eighteenth centuries. The Peace of Amiens, between France on the one hand and England, Holland and Spain on the other, was concluded here in 1802 (see vol. II, p. 136). During the early stages of the war of 1914–18, the Germans occupied Amiens for a short time, but the town subsequently became the headquarters of the British General Staff.

Economic Development

Textile manufacture is the main industry, with corduroys and fustians a speciality. Cotton cloth and Utrecht velvet are also extensively produced. The town has foodstuff packing factories, and it is the chief market for the rich agricultural produce of the plain of Picardy; an important fair is held annually. There are also metallurgical works, including some large locomotive repair shops of the northern region of the S.N.C.F.

Communications

Six main and three secondary railway lines converge on Amiens, which has two stations. The Paris-Boulogne-Calais and the Paris-Lille-Brussels lines pass through the town, although direct Paris-Lille traffic generally avoids it by going through the great junction of Longueau, to the east. The main stream of traffic from the Channel ports to the eastern region and Switzerland goes along the Amiens-Laon line. The Amiens-Rouen line is another important cross-country route linking the industrial areas of the northern coalfield with the lower Seine ports and western France.

The principal road communications are from Paris via Amiens to the Belgian frontier (R.N. 16); west to Neufchâtel-en-Bray, thence either to Dieppe or Havre, and north-east to Cambrai, Valenciennes and Belgium (R.N. 29); north-west to Abbeville and the Channel ports (R.N. 35); south-east to Compiègne for Soissons, Reims and Châlons (R.N. 35).

The waterways traffic to and from Amiens is carried on the Somme Lateral Canal, thus bringing the town into contact with the St Quentin Canal, thence to the Oise and eventually to Paris. The completion of the long-projected Nord Canal was again contemplated in 1938; this would link Amiens directly with the northern coalfield.

ANGERS (pop. 87,988)

General Features

Angers, chief town of the department of Maine-et-Loire, is situated on the banks of the Maine, where the river narrows at a point 8 km. north of its confluence with the Loire. The town has been built on rising ground, about 40 m. above sea level, where the eastern extremity of the Armorican Massif meets the more fertile region of Anjou.

The old town, on the slope overlooking the left bank of the river, is grouped around the cathedral and thirteenth-century *château* (Plate 68). On the lowlying right bank of the Maine, the *Quartier de la Doutre* has developed. In recent times the town has extended in three main directions—to the north-east and east, there are industrial buildings and artisan dwellings; to the south-east, commercial and residential quarters; to the west, parks and allotments.

Angers is an episcopal see and the seat of the Court of Appeal for the departments of Maine-et-Loire, Mayenne and Sarthe. Since 1941, it has been the principal town of a region formed by these departments. Tentative proposals have been put forward in recent years for the establishing of a university in the town; this university would serve the area covered by the economic region of Nantes (see vol. II, p. 269).

History

Angers has for many centuries played an active part in the development of the neighbouring territory. In Roman times it was the chief town of the Andegavi. The counts of Anjou established their residence here in the ninth century. The incursions of the Northmen towards the end of that century and later English invasions during the twelfth century brought heavy suffering to the town. Under the Plantagenets, Angers became in many respects a second capital of the Angevin empire, while the many buildings erected during the twelfth and thirteenth centuries, including the cathedral of St Maurice, formed a pattern for the English school of Gothic architecture. The celebrated university, founded in 1364 and suppressed at the outbreak of the French Revolution, was resuscitated in 1876 as the *Institut Catholique de l'Ouest.* During the war of 1914–18, elaborate preparations were made to equip Angers as a centre of defence in the event of the fall of Paris.

Economic Development

The neighbourhood of Angers is principally agricultural, but an increasing number of industrial activities has developed in recent decades. The most important of these is the slate industry, with large quarries at St Barthélemy and Trélazé, about 6 km. to the east. Textile manufacture, with hemp and flax grown in the *Val de Loire,* is also important. The other industries include the manufacture of cables, ropes, boots and shoes, chemical products, metal frame building and glass ware.

Communications

Angers is the converging point for railway traffic for Nantes and the lower Loire from Paris, central and eastern France. Its main road communications are to Nantes and St Nazaire from Le Mans, Chartres and Paris (R.N. 23); to Rennes and Lorient (R.N. 163); to Saumur and Poitiers (R.N. 152). The road following the south bank of the Loire, and other roads going to the south, are reached by a bridge over the Loire at Les Ponts-de-Cé, 5 km. to the south.

The Maine is navigable below Angers to its confluence with the Loire. Upstream there is little navigation, although the tributary Mayenne is classified as navigable for 135 km.

BORDEAUX (pop. 258,348)

Chief town of the department of Gironde and seat of an archbishopric. Administrative centre of the Eighth Economic Region formed by the Chambers of Commerce of Bordeaux, Libourne, Mont-de-Marsan, Bayonne, Agen, Auch and Pau. Headquarters of the Eighteenth Army Area and of the *Inscription Maritime* for the departments of Vendée (except Noirmoutier), Charente-Inférieure, Gironde, Landes and Basses-Pyrénées. Seat of the Court of Appeal for the departments of Charente, Dordogne and Gironde. Since 1941, the principal town of a region composed of the departments of Gironde (part), Landes (part), and Basses-Pyrénées (part). State broadcasting station.

See vol. IV, pp. 139–53.

CLERMONT-FERRAND (pop. 101,128)

General Features

Clermont-Ferrand, chief town of the department of Puy-de-Dôme and capital of the former province of Auvergne, stands on a steep slope, 410 m. above sea level, to the south-west of the fertile Limagne plain, in the central area of the Central Massif, with the river Tiraine, a tributary of the Allier, skirting the north of the town. The plain runs from north to south, being shut in on the east by granitic massifs and on the west by volcanic outcrops (Plate 70). The most prominent of these outcrops is the Puy de Dôme which rises to a height of 1,465 m. The early growth of Clermont was directly due to its location on the one decisive break in the Central Massif which provided a passage between north and south. At an early time, two highways crossed at this point—one from Paris to Nîmes, the other from Lyons to La Rochelle.

Clermont-Ferrand is an episcopal city with a university. It is the headquarters of the Thirteenth Army Area and the centre of the Seventeenth Economic Region, formed by the Chambers of Commerce of Montluçon, Moulins, Ambert, Clermont-Ferrand, Riom, Thiers and Aurillac. The 'academy', or educational district, of Clermont (see vol. II, p. 221) includes the departments of Allier, Creuse, Puy-de-Dôme, Corrèze, Cantal, and Haute-Loire. In 1941, it became the administrative centre of a region consisting of the departments of Puy-de-Dôme, Cantal, Haute-Loire and Allier (part). The head office of the Bank of France has now, under the Vichy regime, been moved to the town.

History

Since Gallo-Roman times, Clermont has played an important part in the history of Auvergne. With the fall of Vercingetorix and the destruction of Gergovia in the fifth century B.C., Augustonemetum (Clermont) became the chief town of the country of the Arverni. Between the eighth and tenth centuries A.D., the town was sacked and devastated, first by Pepin, and then by the Normans, who gave it the name of *Clarus Mons*. Its medieval history is a chapter of struggles, either between the bishops of Clermont and the counts of Auvergne (see vol. II, p. 48), or between the citizens and their episcopal rulers. It was at Clermont in 1095 that Pope Urban II proclaimed the first crusade. The former feudal borough of Montferrand, situated on a small hill about 2 km. to the north-east, was joined to Clermont in 1731 to form the administrative unit of Clermont-Ferrand. It remains to-day, with a population of about 7,000, in every respect a 'dead' city of the Middle Ages, and it has not to any degree shared in the prosperity of its partner.

Economic Development

The name of Clermont appeared among the woollen manufacturing centres of France in the eighteenth century, when hosiery knitting was introduced among the women of Auvergne. An earlier attempt to encourage the silk industry did not succeed. The town's industrial growth has been largely due to two factors: first, the exploitation of the coalfields around St Eloi to the north and Brioude to the south, and secondly, the improvement of communications. The main industries are (1) rubber—the factories of *Michelin*, *Bergougnan* and *Torilhon* are located at Clermont (see p. 233); (2) chemical products (especially sulphuric acid)—the largest plant is that of *Teisset-Kessler*; (3) mechanical engineering works, chiefly connected with railways (e.g. 'Michelin' rail cars), mining equipment and hydraulic installations (see pp. 211–12); (4) textiles (especially hosiery and ready-made clothing at the works of *Conchon-Quinette*), boots and shoes (the factory of *Mouton-Brun* being outstanding); (5) chocolates and confectioneries. In addition to these, Clermont-Ferrand is the chief market for the agricultural and market-garden produce of the Limagne plain; fruit preserving and wine bottling are active subsidiary industries. The hide and leather market for the departments of Allier and Cantal is also centred in the town. Medicinal springs rising from the volcanic rocks of the neighbourhood have made Royat, about 5 km. to the south of Clermont, a flourishing health resort.

Communications

The chief railway communications are northwards to Nevers and Paris; westwards to Limoges, Brive and Bordeaux; southwards to Nîmes and Narbonne; and eastwards, through the junctions of either Riom or Gannat, to Lyons. The most important road routes from Clermont are northwards to Moulins and Nevers for Paris (R.N. 9 and 7); westwards to Brive and Bordeaux (R.N. 89); southwards to Montpellier and Narbonne (R.N. 9); south-eastwards to Le Puy for

Nîmes, Avignon and the Riviera (R.N. 9 and 102); eastwards to Lyons (R.N. 89). There is a military aerodrome at Aulnat, 6 km. to the east of the town.

DIJON (pop. 96,257)

General Features

Dijon, chief town of the department of Côte-d'Or, and the seat of a bishopric, stands at an altitude of 265 m. at the foot of the Côte-d'Or escarpment on the north-western edge of the extensive and fertile plain of the Saône. The valley of the Ouche, carrying the Burgundy Canal, runs to the west of the town, while the Suzon flows to the north-east. The waters of the latter were formerly diverted to the town's rampart moats, which have now been converted into boulevards.

Dijon is the headquarters of the Eighth Army Area and of one of the four French air commands; it is also the administrative centre of the Eighteenth Economic Region, consisting of the Chambers of Commerce of Dijon, Beaune, Mâcon, Chalon-sur-Saône, Lons-le-Saunier, Auxerre and Sens. The 'academy' of Dijon is formed by the departments of Côte-d'Or, Aube, Haute-Marne, Yonne and Nièvre. The university has faculties of law, science, letters, medicine and pharmacy. Since 1941, Dijon has been the principal town of a region composed of the departments of Côte-d'Or, Yonne, Nièvre, Haute-Saône, Doubs, Jura (part), Saône-et-Loire (part), and Allier (part).

History

The history of the town dates back to Roman times, but it first rose to importance in the eleventh century, when it became one of the most important towns in the duchy of Burgundy (see vol. II, p. 45). Dijon flourished greatly during the fourteenth and fifteenth centuries, until the duchy was united to the French crown on the death of Charles the Bold in 1477. During the wars of the sixteenth and seventeenth centuries, the town was a formidable Catholic stronghold. The eighteenth century brought another period of prosperity. The provincial assembly of Burgundy, under the triple authority of the governor, the bishop of Autun and the mayor of Dijon, met in the town every three years. The schools and salons of Dijon became as celebrated as those of Paris, while its late seventeenth- and eighteenth-century architecture provides further proof of this brilliant

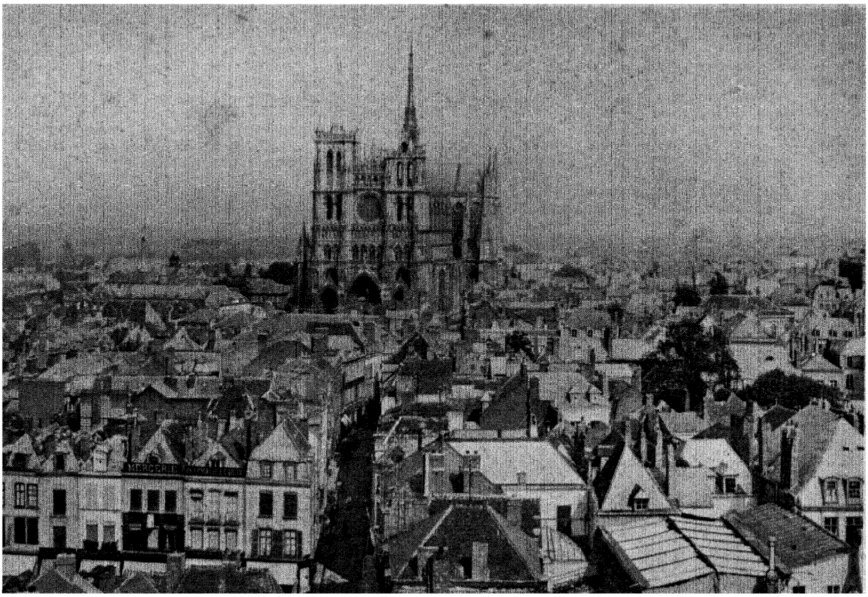

Plate 66. Amiens

The town is dominated by its cathedral, which is the largest in France, and is one of the finest examples of Gothic architecture.

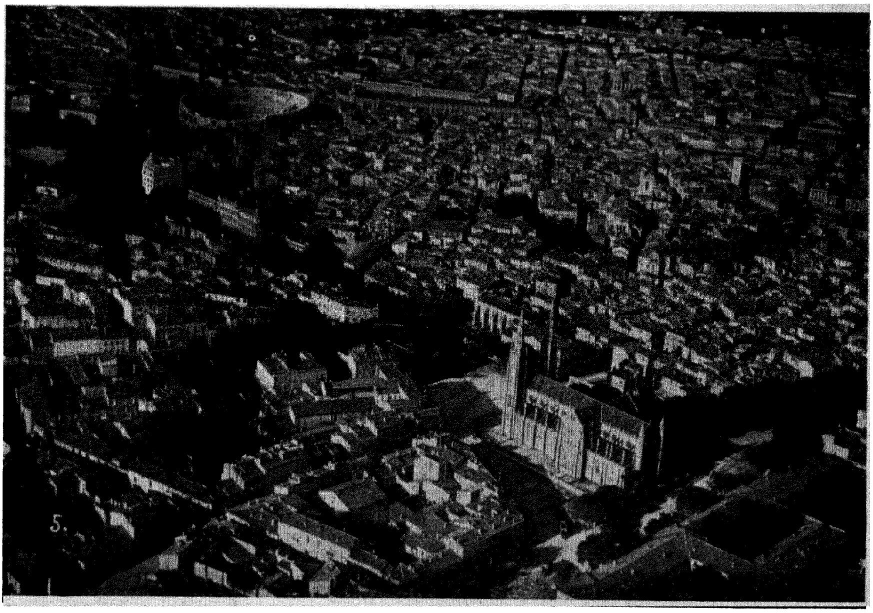

Plate 67. Nîmes

Nîmes was one of the most flourishing towns of Roman Gaul. The medieval city was entirely rebuilt during the sixteenth and seventeenth centuries, but its Roman remains, including the arena (top left of picture) are in an excellent state of preservation. The present cathedral dates only from the late nineteenth century, and is probably the fourth religious building to occupy this site.

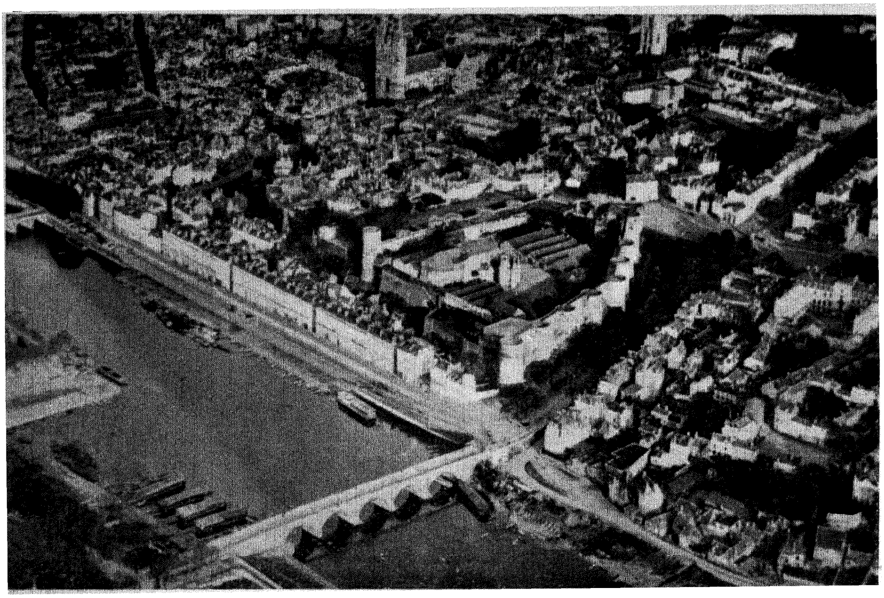

Plate 68. Angers

The old town grew up round the cathedral and the thirteenth-century château on the sloping left bank of the Maine. The château is one of the most striking feudal fortresses of France; it is flanked by a dry moat and its massive walls are strengthened by seventeen towers, each 40–60 m. high. On the far side of the Pont de la Basse-Chaîne is the Quai Ligny (left bank) and the Quai des Carines (right bank).

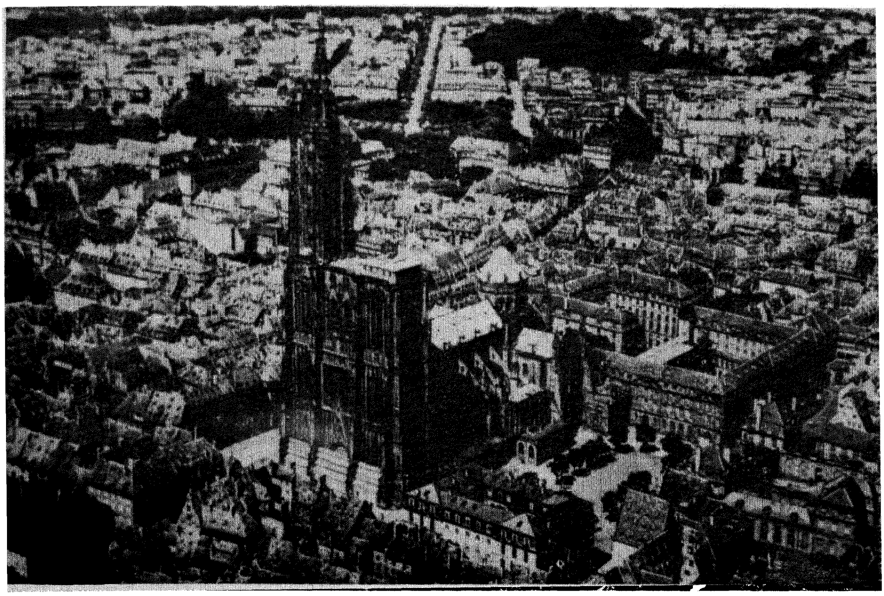

Plate 69. Strasbourg

The central part of the city, built on the site of the Roman settlement, lies on an island surrounded by branches of the Ill. The thirteenth-century Gothic cathedral is built of red sandstone from the flanks of the Vosges.

period. The town was occupied by the Germans for two months in 1870—the cross of the *Légion d'honneur* on the civic arms was awarded in recognition of the fortitude shown by the citizens.

Economic Development

The increase in the population of Dijon, from 39,193 in 1866 to 78,578 in 1921, with a further addition of 17,679 between 1921 and 1936, reflects the expansion of industrial activities in and around the town. Foodstuff preparation has made Dijon famous, especially its mustard and biscuits, while its celebrated *Foire Gastronomique* is held annually. The modern organization for the marketing of Burgundy wines has brought considerable economic advantages to Dijon. The wines, which include Mâcon and Beaujolais vintages, are produced mainly by small cultivators on the slopes of the Côte-d'Or (see Plate 23), and then blended by merchant firms at Dijon.

Motor cycles, cycles, tools and a variety of metal goods are manufactured, and aluminium bars, sections and tubes are produced by *Tréfileries et Laminoirs du Havre*, an associate firm of the Péchiney and Ugine combine. There are also a state tobacco factory, chemical plants, lime and cement works (see p. 231), and boot and shoe factories in Dijon and its neighbourhood.

The position of Dijon as a gap town has given it outstanding importance as a centre of communications. At Dijon, with its main station at Perrigny, the main trunk line from Paris diverges in three main directions to the south and south-east: (*a*) via Dôle to (1) Pontarlier and and thence Berne, (2) Vallorbe and thence Lausanne and the Simplon route; (*b*) via Bourg and Culoz, thence (3) north-east to Bellegarde and Geneva or (4) south-east to Chambéry, Mt Cenis and Turin; (*c*) via the main P.L.M. line to Lyons, thence to (5) Grenoble or (6) the lower Rhône valley, Marseilles and the Riviera. Dijon is also an important centre of transverse routes: through it traffic from western France via Bourges, or south-west France via Limoges and Moulins, passes to the north and north-east via Is-sur-Tille to Nancy; this line like the line through Dôle and Besançon makes connexions with Belfort, Basle, Berne and Strasbourg.

Several main roads from the Paris Basin converge at Dijon, crossing the Saône corridor between the Côte-d'Or and the Jura, thence diverging to the Swiss frontier. The most important routes from the town are north-west to Paris via Tonnerre, Sens and Melun (R.N. 5); southwards via Mâcon for Lyons (R.N. 74 and 6); south-west to Autun and Moulins via Beaune (R.N. 74 and 73); north-east to Nancy and the German frontier via Langres and Neufchâteau (R.N. 74); east to Belfort and Basle (R.N. 70 and 19); south-east to Lausanne and Geneva via Dôle (R.N. 5).

There is an airport at Longvic, 6 km. to the south-east.

GRENOBLE (pop. 95,806)

General Features

Grenoble, chief town of the department of Isère, is situated at the southern end of the Grésivaudan, the broad valley of the middle Isère. The town extends, at an altitude of 215 m., along the left bank of the river Isère near its confluence with the Drac.

Grenoble is the seat of a bishopric and the administrative centre of the Twelfth Economic Region formed by the Chambers of Commerce of Annecy, Chambéry, Grenoble and Vienne. The Court of Appeal for the departments of Hautes-Alpes, Drôme and Isère, roughly corresponding to the area of the former province of Dauphiny, functions in the town. The 'academy' of Grenoble consists of the departments of Haute-Savoie, Savoie, Hautes-Alpes, Drôme, Ardèche and Isère. Its university has long been celebrated for its faculties of science and medicine, and more recently for its school of Alpine geography. There is an important garrison, with heavy fortifications and gun emplacements on the steep sides of the Grande Chartreuse to the north of the town. The Grenoble broadcasting station is state controlled.

History

In Gaulish times, the stronghold of Culero, belonging to the Allobroges, was built on the bluff where the citadel now stands, overlooking the right bank of the river. In Roman times, the town was known as Gratianopolis, and its site, facing the gap separating the Grande Chartreuse from the Vercors Alps, formed the only point where a bridge could be thrown across the Isère. From the fifth to the ninth centuries, Grenoble was successively held by Burgundians and Franks; between the end of the ninth century and the beginning of the eleventh, it formed part of the kingdom of Provence. Later, the town became the historic capital of the Dauphiny of Vienne which was annexed to the French crown in 1349 by Philippe VI (see vol. II, p. 53). Grenoble was sacked by the Protestants during the sixteenth century. The 'parlement' for the Dauphiny met in the town until the French Revolution.

Industries

The region around Grenoble forms an important part of the south-eastern industrial area of France (see p. 176). The increasing significance of the town itself as a focus for this industrial activity is clearly shown by the growth of its population from 24,000 inhabitants in 1832 to 40,484 in 1866, 68,605 in 1901, 77,409 in 1921, and to 90,748 in 1931. The main industry is glove making. Lambskin, the primary raw material, is obtained from the mountain pastures of the Alps, although a considerable quantity of skin is brought from Tarbes in the Hautes-Pyrénées and from Aquitaine. Egg yolk, imported from the Far East by way of Marseilles, is extensively used in the skin preparation. About 15,000 women form the majority of those employed in this industry (see further, p. 245).

Cement production is also an old-established industry. Limestone is quarried in the Grande Chartreuse and brought to the various works by aerial ropeway. The output of cement from the Dauphiny represents about one-quarter of the total production for France.

The extensive use of hydro-electric power has brought electro-metallurgical and mechanical industries to the Isère valley, between Grenoble and Chambéry (see pp. 176–7 and Fig. 79). Aluminium and copper works, engineering shops, paper mills, and silk textile factories (specializing in hosiery) have been established at Grenoble in recent years (see p. 242).

Communications

Many visitors to the massifs of the Chartreuse, Vercors and Belledonne pass through the town. Railway traffic from Switzerland via the Mt Cenis tunnel passes through Grenoble and connects with the Rhône valley at either Valence or Lyons, while another Marseilles-Geneva line, travelling through Aix-en-Provence, Sistéron and Veynes proceeds by way of Grenoble to Chambéry. In addition, Grenoble is the centre of the considerable system of local electrified lines controlled by the *Société Grénobloise de Tramways Electriques.*

Four main cross-country road routes radiate from Grenoble: south across the Col de la Croix Haute to Serre, Sistéron, thence to Marseilles (R.N. 75, 93 and 96); north-west through the Voiron valley to Lyons (R.N. 75 and 85); north-east up the valley of the Isère to Montmélian (R.N. 90), thence either to Chambéry (R.N. 6) or to Albertville for Chamonix (R.N. 90); south-east, over the Col du Lautaret for Briançon and the Italian frontier (R.N. 75 and 91).

HAVRE (pop. 164,083)

Headquarters of the *Inscription Maritime* for the departments of Nord, Pas-de-Calais, Somme, Seine-Inférieure, Eure, Calvados and Manche (except Granville); administrative centre of the *Service Sanitaire Maritime* (see vol. II, p. 239) for these departments.

See vol. IV, pp. 41–51.

LILLE (pop. 200,633)

General Features

Lille, chief town of the department of Nord and former capital of French Flanders, is situated on the clay plain of Flanders on the right bank of the canalized Deule, which flows to the north of the town. The town, surrounded by ramparts, is triangular in shape: on the north-west side stands the citadel, one of Vauban's masterpieces; the station is to the north-east, and the long boulevard de la Liberté crosses the town from the citadel to the Gare des Marchandises in the south-east. The old quarter lies to the north-east of this boulevard (see Plate 71 and compare Plate 1). A belt of industrial suburbs, formerly isolated villages, lies outside the ramparts and is separated from the town by the military zone.

Lille is the headquarters of the First Army Area and administrative centre of the First Economic Region formed by the Chambers of Commerce of Dunkirk, Armentières, Tourcoing, Roubaix, Lille, Douai, Valenciennes, Cambrai, Avesnes, Boulogne, Calais, St Omer, Béthune and Arras. The 'academy' of Lille includes the departments of Nord, Pas-de-Calais, Somme, Aisne and Ardennes. In 1941, the first two departments were grouped to form a province with Lille as the principal town. It became the seat of a bishopric under the archbishop of Cambrai in 1913. The famous university of Douai was transferred to the city in 1887. A state broadcasting station operates from Lille.

History

In the eleventh century Lille was a small feudal settlement on the Deule, dominated by the *Château du Buc* (on the site of the modern church of *Notre-Dame de la Treille*), the residence of the counts of Flanders (see vol. II, p. 44). The settlement was annexed to the French kingdom in 1312, but it became part of the Burgundian lands before the end of the century. Under the dukes (who had now become counts of Flanders) Lille rapidly prospered (see vol. II, pp. 62–4). In the later half of the seventeenth century, the town was besieged for nine days by Louis XIV. Its fortifications were subsequently reconstructed by Vauban. Under the Treaty of Aix-la-Chapelle (1668) it was acquired by France. There was another siege of the town by Marlborough in 1708, but the Treaty of Utrecht in 1713 established its position as a French town (see vol. II, pp. 87–92). During the war of 1870–1, Lille became the military and administrative centre of northern France. Although it was declared an open city during the war of 1914–18, the town suffered heavy bombardment.

Economic Development

With its population of 200,633 (over 390,000 including the suburbs), Lille owes its size to its industrial development during the nineteenth century and, to a lesser degree, to its importance as an agricultural centre (see Fig. 26). Since the introduction at Lille in 1801 of the first steam spinning mill in France, the town, with Roubaix-Tourcoing, has become one of the chief textile manufacturing centres of the country (see pp. 233–7 and Figs. 83, 84). Its textile products are: (1) Cotton—in 1938, there were 1,587,000 ordinary spindles, and 727,500 twisting spindles, with over 25,000 workers. Sewing threads, lace threads for shoemakers and cordwainers as well as cotton wool and bandages are produced on a large scale. (2) Linen—although 87,000 out of 538,000 spindles were idle at the end of 1934, Lille has four-fifths of the total spindle capacity of France. The linen is woven, bleached and dyed; nearly 8,000 people are employed in about forty mills. (3) Flax and hemp spinning—nearly thirty mills, 300,000 spindles and about 15,000 people employed. (4) Woollen, rayon and mixed fabrics. The manufacture of ready-made clothing provides employment for about 3,000 people in factories, but there is a considerably larger number of people who work in their own homes.

There are large metallurgical and engineering establishments at Lille, especially in the suburbs of Fives and Hellemmes; they make textile and agricultural machinery, electric motors, railway locomotives and other rolling stock (see pp. 201–2).

The chemical industry includes the Kuhlmann works, oil depots and small refineries (e.g. those of *Les Consommateurs de Pétrole*), in addition to paint and varnish factories.

The preparation of foodstuffs includes sugar refineries, chocolate and confectionery works, starch works, distilleries and breweries. Other concerns are a state tobacco factory, tanneries, brick, tile and cement works and joinery mills. There are large power stations close by on the waterways around Lille (see p. 215 and Plate 57).

Communications

The town is a busy crossing point for railway traffic from Dunkirk to Lorraine, from Calais to Brussels, and from Paris to Ghent and Brussels.

The chief road routes are north to Ostend, Ghent and Bruges (R.N. 17), west to the Channel ports (R.N. 42), south to Paris via Cambrai (R.N. 17); or via Arras and Amiens (R.N. 25 and 16), and north-east to Brussels via Tournai (R.N. 41).

The Deule Canal, flowing to the north, connects the town with the Lys and Scarpe waterway systems as well as linking it with the Channel coast by way of the Aire Canal and the river Aa. In 1936, 364,000 metric tons of water-borne traffic were handled on its quays.

LIMOGES (pop. 95,217)

General Features

Limoges, chief town of the department of Haute-Vienne, is built on a hill rising to an altitude of 290 m. on the right bank of the river Vienne in the western area of the Central Massif. Backed to the north by the Monts de la Marche, the town faces the Monts du Limousin to the south and the moorland plateau of Millevaches to the south-east. The Vienne valley is steep and narrow, and the location of Limoges has made it a converging point of routes crossing the plateau. Its importance as a centre of communications began in Gallo-Roman times when a ford was constructed across the river. The old town, built on the bluff overlooking the river, is now dominated by the thirteenth-century cathedral. Five bridges (one carrying the railway to Toulouse) cross the Vienne as it flows past the town.

Limoges is the headquarters of the Twelfth Army Area and the administrative centre of the Seventh Economic Region formed by the Chambers of Commerce of Niort, Poitiers, La Rochelle, Rochefort, Angoulême, Cognac, Limoges, Guéret, Tulle, Brive, Périgueux and Bergerac. The Court of Appeal for the departments of Corrèze, Creuse and Haute-Vienne sits in the town. Since 1941, it has been the principal town of a region formed by the departments of Haute-Vienne, Corrèze, Creuse, Dordogne (part), Charente (part), Vienne (part), Indre, Cher (part), Indre-et-Loire (part). The bishopric of

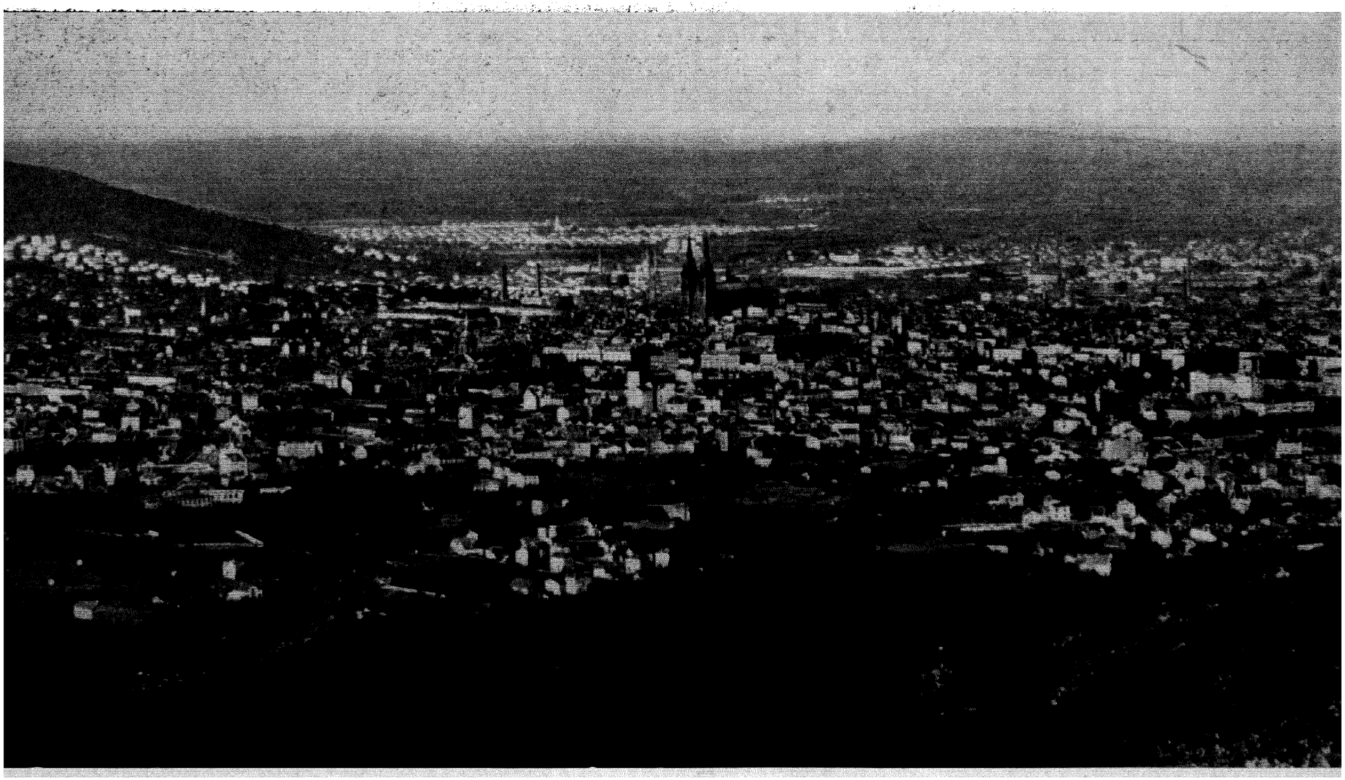

Plate 70. Clermont-Ferrand

View across the town looking north-eastwards from the Puy de Gravenoire. The old town round the cathedral is built on a mass of volcanic rock. In the foreground is part of the residential area and spa of Royat; in the background are the white buildings of the extensive Michelin works, and in the far distance is the Limagne plain

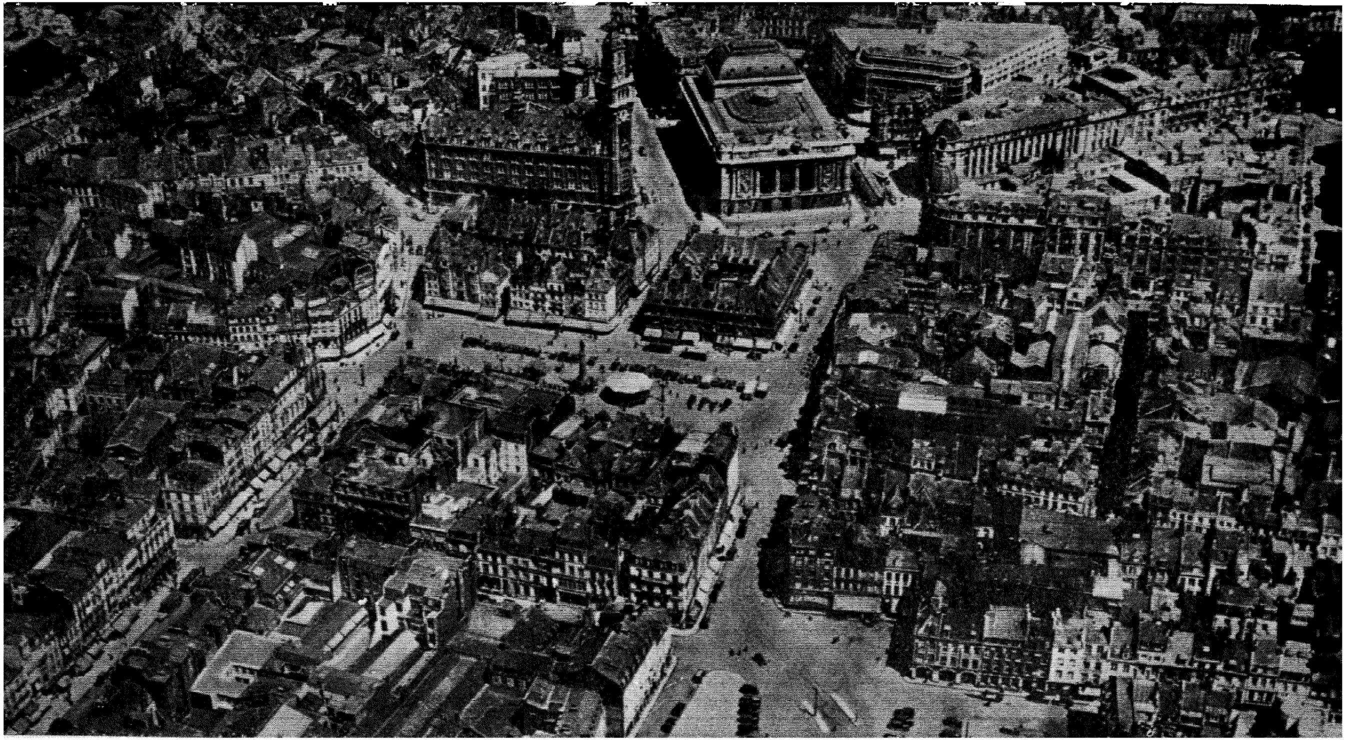

Plate 71. Lille

The focus of municipal life at Lille is the Grande Place, dominated by the Bourse (with its prominent belfry). Such an arrangement, closely resembling the pattern of Flemish commercial towns, stands in contrast with the cathedral-dominated cities of the Paris Basin (see Plate 1).

Limoges comes within the province of Bourges. The town has a state broadcasting station, and the National School of Decorative Art is established here.

History

During the Middle Ages, Limoges was in turn a possession of Aquitaine and England; it did not become a part of the French kingdom until the reign of Henry IV (see vol. II, Fig. 19). Throughout this time the town was divided into two parts, separated from each other by ramparts which remained until 1792. The cathedral borough (the *cité*) came under episcopal jurisdiction while the *château* area was ruled by the viscounts of Limoges. During the Hundred Years' War, the bishops of Limoges supported the French cause, while the viscounts were unwilling supporters of England. In 1370, the *cité* was taken by the Black Prince. Limoges was famous in the seventh century for the work of its goldsmiths, but it became more celebrated in the Middle Ages for its enamel industry. Its trade during the fifteenth century brought great prosperity which continued until the seventeenth century, when its wares reached the Netherlands and Portugal.

Economic Development

Towards the middle of the eighteenth century, the discovery of china clay at St Yrieix, about 30 km. to the south, opened the way for the porcelain industry to develop at Limoges, while its enamel crafts began to decline. The development of canal and railway communications in the nineteenth century further strengthened the growth of manufactures in the immediate neighbourhood of the town. The manufacture of tiles, bricks, and porcelain employs about 35,000 people; china clay is brought from the granite quarries at St Yrieix and prepared in works situated along the Vienne. In addition, there are engineering and metallurgical works (especially for motor-car coachwork and motor-cycle accessories), important tanneries and boot factories as well as workshops connected with the state manufacture of tobacco. Although not developed on a large scale, the woollen industry has long been established here. Glue and perfume production is of secondary importance.

Communications

The main railway routes are: to Paris via Vierzon and Orléans; to Toulouse via Brive and Montauban; to Périgueux and

Bordeaux; to Angoulême and thence to Rochefort and La Rochelle; to eastern France via Montluçon; to south-eastern France via Clermont-Ferrand. The electrified system of the *Chemins dc Fer Départementaux*, focusing on Angoulême, also operates from the town.

The most important road communications are north to Paris through Châteauroux and Orléans (R.N. 20); north-west to Poitiers and Tours (R.N. 147); south-west to Bordeaux and the Spanish frontier, either through Angoulême (R.N. 141 and 10) or through Périgueux (R.N. 21); south to Toulouse via Brive and Montauban (R.N. 20); east to Clermont-Ferrand and Lyons (R.N. 141 and 89). There is an airport 3 km. to the south-east, and the Vienne is navigable for rafts above Limoges.

LYONS (pop. 570,622)

General Features

Lyons, chief town of the department of Rhône and third largest city in France, is situated in a valley at the confluence of the Rhône and Saône (see vol. I, p. 118 and Plate 47). The corridor formed by the valleys of these two rivers has from early times served to connect the Mediterranean with the North Sea and the Rhine; the road to Clermont-Ferrand afforded communication to western and south-western France.

Including its suburbs, the total population of Lyons is slightly over 755,000 as compared with a total of 323,954 (city) in 1866 (see Fig. 26). The town divides itself into three clearly defined districts which are indicative of the direction of its urban development (Plate 73). (1) The old town (the quarter of St Jean) is clustered around the low bluffs of the Fourvière hill, on the right bank of the Saône. The cathedral, dating from the twelfth century, and the *Palais de Justice* are situated here. (2) The central part, on the long narrow 'peninsula' between the two rivers, has further subdivisions; the district of Terreaux and Bourse lies between the high ground, on which the populous artisan area of La Croix-Rousse has grown, and the Place-Bellecour; to the south, between the Place-Bellecour and the confluence, is the entirely industrialized quarter of Bellecour and Perrache, built in the eighteenth century on marshland reclaimed by the sculptor Michel Perrache. (3) The modern extension of Lyons has developed along the plain on the left bank of the Rhône: towards the south is the university quarter, while to the east the industrial district of La

Guillotière extends almost without a break into the important suburb of Villeurbanne. Since 1866, when it was a village of 6,660 inhabitants, Villeurbanne has grown into an industrial town of 81,322 inhabitants, and it has an impressively planned civic centre. To the north of La Guillotière is the middle-class quarter of Les Brotteaux. The central 'peninsula' is about 4 km. long and it varies from 600 to 800 m. in width. The altitude at the confluence is 165 m. above sea level, while the hill of Fourvière rises to 295 m.

Lyons is a metropolitan see and its archbishop holds the title of *Primat des Gaules*. The town has a military governor and it is the headquarters of the Fourteenth Army Area. The Thirteenth Economic Region, consisting of the Chambers of Commerce of Bourg, Lyons, Tarare, Villefranche, Roanne, Le Puy, Brioude, Annonay, Valence, St Etienne and Aubenas, has its administrative centre at Lyons. The Court of Appeal for the departments of Ain, Loire and Rhône functions from the town. The 'academy' of Lyons includes the departments of Rhône, Ain, Saône-et-Loire and Loire. Many former members of the university of Lyons have played an important part in the political and public life of France. Since 1941, Lyons has been the principal town of a region formed by the departments of Rhône, Loire, Ain (part), Saône-et-Loire (part), Jura (part), Ardèche, Drôme, Savoie, Haute-Savoie and Isère. The *Musée des Tissus* in the *Palais du Commerce* on the Place des Cordeliers contains valuable specimens of silks and embroideries and is the only one of its kind in the world. The annual International Fair attracts traders from many countries. There are two broadcasting stations—one state controlled and the other privately owned.

History

Unlike a large number of the cities of Roman Gaul, which had their origin in pre-Roman foundations, the history of Lyons goes back only to 43 B.C., when the Romans founded the colony of Lugdunum (the fort of Lug). A century later, because of its importance as a centre of communications, this colony became the capital of Roman Gaul (see vol. IV, p. 333 and Fig. 104). Its strategic position in Roman times made Lyons a point for the exchange of both merchandise and ideas. By the early Middle Ages, with the growth of pilgrimages, many religious foundations had been established here. Later, as capital of Lyonnais, the town belonged successively to Burgundy, Provence and the Holy Roman Empire; it was not until the fourteenth century that it came under the sovereignty of the

French king (see vol. II, p. 53). The annexation of the county of Lyons to the French crown began a century of great prosperity for Lyons. Foreign merchants flocked into the town, and the Dauphin Charles established two fairs in 1420 to replace the famous fairs of Champagne which was then in English hands; two other fairs were created in 1462 (see vol. II, pp. 68–9). Its *bourse* (stock exchange), opened in 1506, is the oldest in France.

Although the majority of the citizens welcomed the French Revolution, Lyons was a stronghold of stubborn royalist opposition, and it was besieged by a force under Kellermann. After surrender, a part of the town was ordered to be destroyed as a reprisal measure. Its former prosperity did not reappear until the first quarter of the nineteenth century, but it was firmly established by the middle of the century when economic and industrial conditions became stabilized. The *Crédit Lyonnais*, one of the leading joint-stock commercial banks, was established in 1863.

Economic Development

The economic importance of Lyons is due primarily to the silk trade which was introduced by Italian immigrants in the Middle Ages (see also vol. II, p. 99). In 1450, Charles VII gave the merchants of Lyons the silk monopoly for his whole kingdom. The cultivation of mulberry trees and the rearing of silkworms on the Monts du Vivarais, south of the St Etienne depression, were augmented by the importation of raw silk from the Cévennes. Lyons maintained its monopoly of the trade for several centuries before being superseded by Milan. At first, hand-loom weaving was carried on by artisans who lived and worked in the Croix Rousse (Plate 74). Despite the introduction of mechanical looms in the nineteenth century, the position of both the individual craftsman, with his cottage industry, and the small factory has been preserved, although the number of hand-looms owned by these master weavers has shown a considerable decrease in the last few years. There has been a growing tendency within the last sixty years for the weaving mills to be dispersed away from Lyons itself into neighbouring towns in the departments of Rhône, Isère and Ain, but Lyons has remained the commercial centre of the silk textile industry (see p. 240). At the present time, only a minor proportion of the raw silk comes from France, the greater part being imported from Italy, from the Levant, where French industrialists own important mills, and from the Far East. In addition to silk spinning and weaving, with fine cotton working, Lyons is an important producer of machine lace and embroidery. Rayon production has become increasingly important in the town within recent years; thus, an acetate rayon plant has been installed by *Rhodiaseta*, a branch of the *Comptoir des textiles artificiels* (*C.T.A.*) and the Rhône-Poulenc combine. The distribution of the rayon factories in the Lyons area is shown in Fig. 85 (see also p. 242).

The commercial and financial influence of Lyons has considerably helped the development of the metal and engineering industries of central France (see p. 204). In addition to the large locomotive works at Givors to the south-west (see p. 211), there are extensive engineering and metallurgical works in the urban area of Lyons itself. Those of the *Société du Carburateur Zénith*, the *Rochet-Schneider* company and *Cottin-Desgouttes* are the best known. Tin-plate manufacture is represented by the factories of the *Société des Cirages Français*, the *Carnaud et Basse Indre* company, which specializes in finished products such as metallic containers, etc., and the *Lion Noir*, a boot-polish company which has its own tin-box plant. These industries are supplied with hydro-electric power from the Alps and the Jura, supplemented in times of need by large thermal stations in the Lyons district.

Nearly 12,000 people are employed in various branches of the chemical industry, ranging from the production of heavy chemicals, pharmaceutical and photographic materials, and synthetic perfumes to dyes, paints and varnish. (For vegetable oil refineries, see p. 230.) The *Consommateurs de Pétrole* have large depots and works in the port area.

Leather also plays a part in the economic life of the town (see p. 245). The manufacture of finished leather goods forms one aspect of an industry which covers the collection and distribution of hides and skins for delivery to Marseilles, Grenoble, Annonay and Roanne. Glass making, tobacco and foodstuff preparation are further industrial activities grouped around Lyons, while horticulture (especially of roses and fruit) flourishes in Lyonnais.

Communications

The Saône depression has been for centuries one of the most vital corridors of communication in Europe, and the location of Lyons has inevitably brought it an outstanding nodal significance. It is the principal railway centre of the south-east region of the S.N.C.F., and it serves to connect the south of France with central Europe via

Besançon. The main station is the *Gare de Perrache* on the south of the 'peninsula'; this station, together with the *Gare de Vaise* to the north, on the right bank of the Saône, handles the traffic for Paris, via Villefranche, Chalon, and Dijon. The traffic south from Lyons goes through Valence, Avignon, Tarascon (for Nîmes, Sète and the Midi), thence to Marseilles. The lines to the north-east leave from Perrache and the *Gare des Brotteaux*, on the left bank of the Rhône; to Bourg, Lons-le-Saunier, Mouchard and Besançon for Strasbourg; to Ambérieu and Culoz, thence either to Geneva via Bellegarde or to Chambéry, Modane and Turin via Aix-les-Bains. The line from Lyons to Grenoble and Veynes travels south-east through Moirans. Westwards, the route via Roanne diverges at St Germain-des-Fossés either for Moulins to the north or for Gannat and Riom to the south. There are subsidiary stations at St Paul in the Fourvière district, La Croix-Rousse, St Clair on the left bank of the Rhône, Ouest-Lyonnais, and Est-de-Lyons on the eastern outskirts of La Guillotière. For goods traffic there are extensive marshalling yards at La Guillotière and Vénissieux, on the south side of the city; the P.L.M. railway has large repair works at Oullins, a south-west suburb.

As in Roman times, when it was the point of divergence for trans-Alpine routes to Spain, north-west France and the Rhineland, Lyons remains an outstanding focus of road communications. (For its importance in the seventeenth century, see vol. II, Fig. 27.) The major routes are north to Paris: (1) via Mâcon and Auxerre (R.N. 6); (2) via Dijon, Tonnerre and Sens (R.N. 6 and 5); (3) via Moulins and Nevers (R.N. 7); south, for Avignon, thence either to Nîmes, Narbonne and the Spanish frontier or to Marseilles and the Riviera (R.N. 7); west, via Clermont-Ferrand for Bordeaux and the Biscay coast (R.N. 89); north-east, through Bourg, Lons-le-Saunier and Besançon for Belfort, Basle and Strasbourg (R.N. 83), direct to Geneva (R.N. 84); south-east, branching at Bourgoin for either Chambéry and the Italian frontier (R.N. 6) or Grenoble (R.N. 85 and 75).

The Saône is navigable and canalized between Lyons and Corre, 374 km. to the north-east. Lyons has become a terminus for considerable water traffic, and in 1936 it was the eighth inland port of France. The port area is within the town and consists of a series of quays on the right bank of the Saône just above the confluence. Most of the traffic is handled at Port Rambaud, opened in 1926, with a frontage of 1,000 m. and 250 m. length of petroleum wharves. Considerable progress has been made with the construction of Port Edouard-Herriot, begun in 1936, on the left bank of the Rhône, 3 km. below

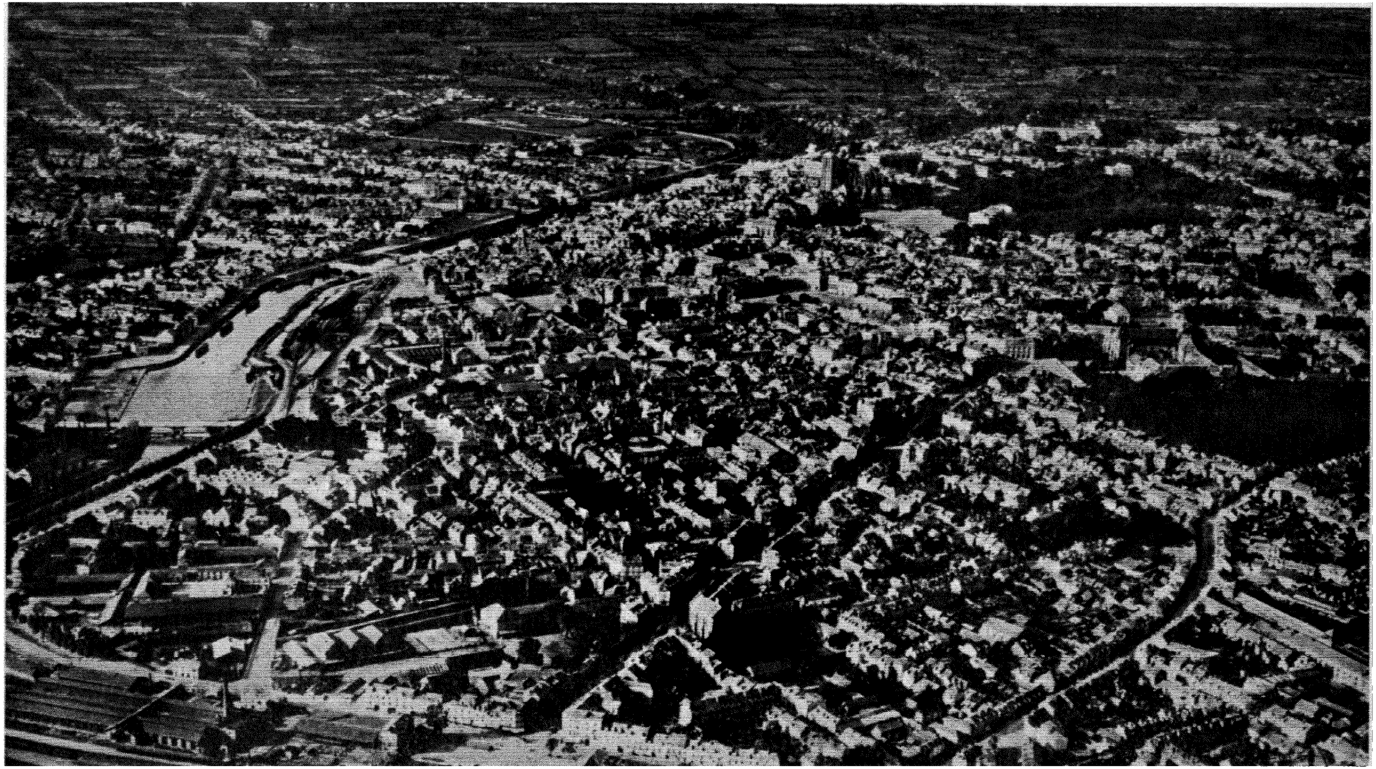

Plate 72. Le Mans

Le Mans is situated on the river Sarthe. The nucleus, around the cathedral, lies on a narrow hill on the left bank; the town has expanded southwards, and more recently a populous residential district has developed on the opposite bank. The river has been widened to form a port, but there is little traffic. In the bottom left corner is the railway station.

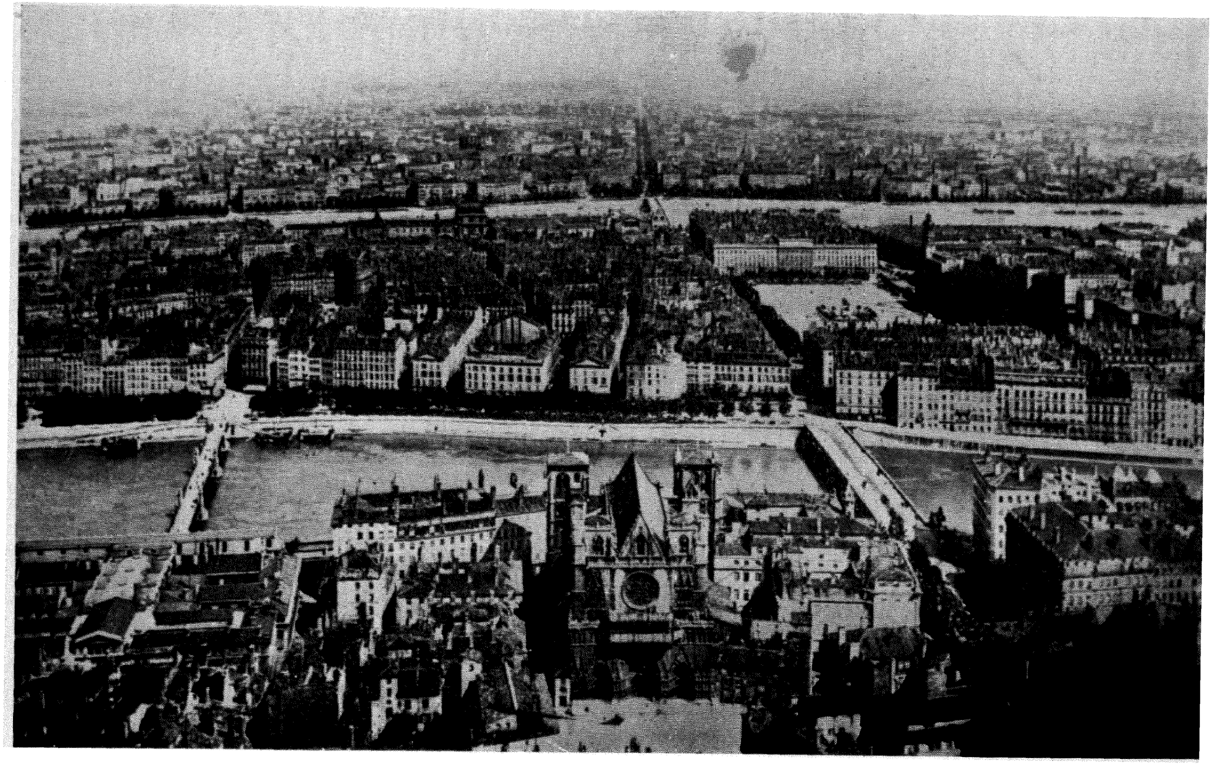

Plate 73. Lyons

A general view of the city, looking eastwards from the Fourvière hill across the Saône and Rhône. In the foreground is the cathedral of St Jean, the centre of the old town, on the banks of the Saône. On the peninsula between the two rivers is the Place Bellecour, surrounded by eighteenth-century buildings.

the confluence, in the industrial quarter to the south-east of the town. The port will cover an area of 150 ha. and will be connected with the principal marshalling yards. There is also a project to construct a junction canal across the south-east of the town from Port Edouard-Herriot to the upper Rhône (see further, vol. IV, pp. 415–18).

There is an airport at Bron 7 km. to the south-east of Lyons.

LE MANS (pop. 84,525)

General Features

Le Mans, chief town of the department of Sarthe, and former capital of the duchy of Maine, is situated on high ground dominating the confluence of the Sarthe and Huisne rivers. To the west of Le Mans lies the *bocage* country of western Normandy which descends sharply into the Sarthe valley. Limestone tracts above the valley between the town and the plateau have been cleared of wood and hedges, and have been turned into open cultivated land.

At first, the site of Le Mans was purely defensive, but by the twelfth century building had been developed along the river. The town, which extends for 4 km. and gradually reaches an altitude of 96 m., is divided into two parts by the Sarthe. On the left bank, a short distance upstream from the confluence, and rising on a narrow hill, is the old town dominated by the cathedral. Extensive modern quarters have now been built around the hill, which is cut by a tunnel. More recently, a populous residential district has developed on the right bank of the river (see Plate 73).

Le Mans is the headquarters of the Fourth Army Area and the seat of a bishopric attached to the province of Tours.

History

The town was founded in Gallo-Roman times, and its history during the Middle Ages was mainly a series of revolts and battles. Henry II of England was born here in 1133, and on his accession to the English throne, the county of Maine passed to the English crown (see vol. II, pp. 54–5). It was restored to the counts in the reign of John, and in 1481 it became part of the French kingdom. Later, under Louis XIV, the region of Maine became a duchy. During the Franco-Prussian war of 1870–1, Le Mans was the operational base for General Chanzy; in January 1871, the result of a battle fought on the eastern and southern sides of the city made impossible the deliverance of Paris by the French.

The cathedral of St Jean, with its combination of Romanesque and Gothic styles, is one of the most remarkable in France. The older portion is Romanesque and was begun in the latter half of the eleventh century, while the examples of Gothic architecture belong to the twelfth and thirteenth centuries.

Economic Development

A diversity of industries is based on Le Mans. Of metallurgical and mechanical works, the most important are motor-car and aero-engine construction, at the *Léon Bollée* factories (see p. 212), and the manufacture of agricultural machinery. A branch of the *St Gobain* company produces superphosphates, pharmaceutical drugs and waxes. There are also a state tobacco factory employing about 700 people, ready-made clothing mills, and mirror and stained glass works. The town is a market for the considerable produce of the varied agricultural activities of the *plaines* to the east.

Communications

Several important routes converge on Le Mans. By rail, it is the junction for Brest, south Brittany and the lower Loire from Paris and the Channel ports. It is also the terminus of the most recent of the electrified main lines from Paris via Chartres. The main road routes lead north to Rouen and the Channel coast (R.N. 138); north-east to Paris through Chartres (R.N. 23 and 10); west via Laval to Rennes and Brest (R.N. 157 and 12); south-west, through Angers to Nantes (R.N. 23); south to Tours for south and south-eastern France (R.N. 158).

The Sarthe has been rendered partly navigable below Le Mans, but the Huisne is extremely difficult for navigation owing to serious annual inundations. There is a project for considerable extensions to the port and the town.

MARSEILLES (pop. 914,232)

Chief town of the department of Bouches-du-Rhône and the seat of a bishopric in the ecclesiastical province of Aix. Administrative centre of the Eleventh Economic Region formed by the Chambers of Commerce of Alès, Nîmes, Avignon, Marseilles, Arles, Gap, Digne, Toulon, Nice, Ajaccio and Bastia. Headquarters of the Fifteenth Army Area and of the *Inscription Maritime* for the departments of Pyrénées-Orientales, Aude, Hérault, Gard, Bouches-du-Rhône and

Vaucluse. Administrative centre of the *Service Sanitaire Maritime* for the departments of Pyrénées-Orientales, Aude, Hérault, Gard, Bouches-du-Rhône, Var, Alpes-Maritimes and Corsica. Since 1941, the principal town of a region composed of the departments of Bouches-du-Rhône, Gard, Vaucluse, Var, Alpes-Maritimes, Hautes-Alpes, Basses-Alpes and Corsica. State broadcasting station.

See vol. IV, pp. 175–92.

METZ (pop. 83,119)

General Features

Metz, chief town of the department of Moselle, is situated to the east of the *Côtes de Moselle* on the north-western edge of the undulating clayland of the Lorraine plateau. The town is built around a hill, 175 m. above sea level, on the right bank of the river Moselle at the angle formed by the confluence of the Seille. The Moselle divides into many branches and forms a number of islands within the town. On the west are the islands of St Symphorien and Sauley; to the north, beyond a small island on which the Prefecture stands, is the Ile Chambière. The original site of the old town on the hill at the confluence is now a fortified area with the Place Ste Croix at the summit.

Metz is the seat of a bishopric, the headquarters of the Sixth Army Area and a fortified town of the first class.

History

During the early stages of its history, Metz became in turn a Gaulish stronghold and a Roman post on the road to Frankfurt and the Rhine. At the beginning of the sixth century, when it was first known as 'Mettis', it became a Frankish centre. The Treaty of Verdun in 843 assigned the town to Lothaire, and the name of a part of the middle kingdom of Lotharingia is now preserved in 'Lorraine'. In the Middle Ages, although nominally an episcopal city owning allegiance to the Holy Roman Empire, Metz gradually established itself as a 'free city'. It was frequently involved in struggles with the kings of France as well as with the dukes of Luxembourg, Bar and Lorraine. The city had a strong Protestant element in the sixteenth century; its was occupied by the French in 1552, protected by them in 1559 and ceded to France in 1648 (see vol. II, pp. 88–9). The 'parlement' of Metz, established by Louis XIV in 1663, had jurisdiction over the town, the *pays Messin*, the dioceses of Toul, Metz and Verdun, and the Abbey of Gorze. The Revocation of the Edict of Nantes caused great emigration of Protestants from the town, and it has been estimated that in 1698 there were 22,000 inhabitants compared with a population of about 60,000 in 1552. Throughout the seventeenth and eighteenth centuries Metz was an important frontier fortress; its fortifications were constructed under the direction of Vauban.

With the French Revolution, the 'parlement' of Metz was replaced by a directory, and a military commander assumed the duties of governor. The town became the seat of the prefecture for the newly created department of Moselle. The nineteenth century brought an appreciable recovery in its population, and by 1866 there were 54,817 inhabitants. After the Franco-Prussian war of 1870 the town remained in German hands until its return to France in 1918. The civic arms bear the cross of the *Légion d'honneur.*

The bishopric of Metz, founded in the third century, formed part of the ecclesiastical province of Trier until 1790. Between 1801 and 1871 it was attached to the province of Besançon, but since then it has been under the direct supervision of the Holy See.

Economic Development

The chief industry of Metz is the preserving (canning and bottling) of fruits, vegetables and meat, and the bottling of wines. Although heavy repair works for locomotives (e.g. those of the *Chemins de Fer d'Alsace-Lorraine*) and engineering works are centred around Metz, the first signs of the industrial activity of the Metz-Thionville orefield with its numerous iron and steel works (see pp. 194–201) are the blast furnaces of Maizières-lès-Metz, about 10 km. to the north of the town. There are large lime kilns and cement and plaster works in Metz, as well as important tanneries, flour mills, breweries and a state tobacco factory.

Communications

The town is a busy converging point of railways. The chief routes are: Luxembourg-Thionville-Metz-Nancy, thence either to Belfort and Switzerland, or to Dijon and the Mediterranean; Metz-Saarbrücken; Metz-Verdun-Paris; the recently completed Metz-Lérouville-Paris line; and Metz-Thionville-Mézières-Channel ports.

The road communications radiating from Metz are west to Paris by way of Verdun and Châlons (R.N. 3), south to Nancy for Epinal and the Swiss frontier, either through Belfort and Basle or through

Vesoul and Besançon (R.N. 57); south-east to Strasbourg (R.N. 55 and 4); north-east to Saarbrücken (R.N. 3); and north to Luxembourg (R.N. 53).

The Moselle Canal, opened in 1932, passes round the town, joining the navigable Moselle north of Metz (see vol. IV, pp. 399–401).

MONTPELLIER (pop. 90,787)

General Features

Montpellier, chief town of the department of Hérault, is situated on the coastal plain of lower Languedoc to the north-east of the Etang de Thau. It is built on ground rising to a height of 25–50 m. above sea level on the right bank of the river Merdanzon, which flows into the Lez about 1 km. to the south. The area of the old town is delimited by boulevards extending along the Merdanzon on the north, and on the south by the Babotte tower at the angle of the Bd Victor Hugo and the Bd de l'Observation (Plate 74).

Montpellier is the seat of a bishopric in the ecclesiastical province of Avignon. It is the headquarters of the Sixteenth Army Area and the administrative centre of the Tenth Economic Region, formed by the Chambers of Commerce of Béziers, Sète, Montpellier, Carcassonne, Narbonne, Millau, Rodez, Mende and Perpignan. The Court of Appeal for the departments of Aude, Aveyron, Hérault, and Pyrénées-Orientales also meets in the town. The 'academy' of Montpellier includes the departments of Hérault, Gard, Aude, Lozère and Pyrénées-Orientales. Its university is celebrated for its schools of medicine and botany. Since 1941, Montpellier has been the principal town of a region formed by the departments of Hérault, Lozère, Aveyron, Aude and Pyrénées-Orientales. A state broadcasting station operates from the town.

History

Between the tenth and fourteenth centuries, Montpellier consisted of two boroughs, Montpellier itself (*Mons Pessulus*) and Montpelliéret, each being separately governed, the former under the family of Guilhems, the latter under the bishops of Maguelone. In 1536, the see of Maguelone was transferred to Montpellier. The university was created by Pope Nicholas IV in 1289; its medica schools have long been celebrated. As a result of ravaging epidemics, the population of Montpellier decreased from over 10,000 house-holds in 1300 to 334 in 1412 (see vol. II, p. 69). The botanic garden, the first of its kind in France, was set out during the reign of Henry IV (1589–1610). From the sixteenth century until the French Revolution, Montpellier was the seat of the government of Languedoc, as well as the centre for one of the two administrative councils for the province. With the Reformation, many of the inhabitants became zealous Huguenots (see vol. II, pp. 76, 81). With Montauban and La Rochelle, Montpellier was a Protestant stronghold held by the Duc de Rohan, and the town suffered severely during the struggle between 1615 and 1628 (see vol. II, pp. 71–3). Many English visitors travelled to Montpellier during the eighteenth century, when it was a celebrated health resort, and the town's famous aqueduct was built in this prosperous period.

Economic Development

Before Provence was united to France in 1487, Montpellier, with its port at Maguelone, was a busy cosmopolitan town, providing French commerce with its only opening to the Mediterranean. To-day it is the centre for the wine trade of Hérault, which produces more wine than any other department in France. Viticulture began to be extensively developed in the eighteenth century, and the special attention given to botany at the university has greatly helped wine growing not only in Hérault but also in the departments of Aude, Gard and Pyrénées-Orientales. In addition to the marketing of wine and agricultural produce, the other industrial activities of Montpellier are connected with the manufacture of cotton and woollen goods, drugs, soap and waxes, perfumes and dyes. Electric rolling stock is repaired here, and there are works for light machinery construction. In recent years there has been successful oil prospecting at the foot of the Pic de St Loup, about 20 km. to the north of the town.

Communications

Apart from local lines, the main railway connexions of Montpellier are eastwards to the Rhône valley, and westwards to Narbonne and the Spanish frontier. A line going roughly north-east connects it with the Alès coalfield.

The town's chief road communications are northwards to Clermont-Ferrand and Moulins, thence to the Paris basin (R.N. 109 and 9); eastwards to Nîmes and Avignon, thence along the Rhône valley to Valence for either Lyons or Grenoble (R.N. 87 and 7); westwards to Narbonne, thence either to the Spanish frontier or to Carcassonne and Toulouse (R.N. 9 and 113)

The Lez is never used for water traffic although it is classed as navigable and at one time connected Montpellier with the Midi Canal, thence with the Mediterranean at Palavas-les-Flottes.

MULHOUSE (pop. 96,697)

General Features

Mulhouse, the industrial capital of Alsace and sub-prefecture of the department of Haut-Rhin, stands at an altitude of 240 m. on the southern extremity of the Alsace plain, between the High Vosges and the Rhine. The town overlooks the river Ill, and to the south-east it faces the hills forming the northern end of the Jura. The river Doller, one of the Vosgian streams, flows into the Ill to the north of the town.

History

The Germanic origin of Mulhouse is shown in its name, which is derived from *Mühle-haus.* A city was established on the present site in the thirteenth century, and a century later it formed one of the ten imperial cities of Alsace. By the beginning of the fifteenth century, although it remained nominally an imperial city, Mulhouse had acquired considerable autonomous rights, and formed a defensive alliance with Berne and Soleure. In 1515, it was admitted into the alliance of the thirteen Cantons of Switzerland and remained thus until 1797, when it elected to be united to France (see vol. II, p. 89). The town was occupied by the Germans during the war of 1870–1; it remained German until its return to France under the Treaty of Versailles.

Economic Development

The growth of Mulhouse, which had only 5,000 inhabitants in 1798 compared with 58,773 in 1866, has been due to its industrial expansion during the nineteenth century. At the end of the eighteenth, three of its citizens—Koechlin, Schmaltzer and Dollfus—introduced the printing of Indian muslin for the Paris market. Later, with the development of steam power, Mulhouse became the textile centre of the Haut-Rhin country. By 1938, it had 60,000 textile workers operating on 1,740,000 ordinary spindles and 164,000 twisting spindles. Printed calico, sewing thread, coloured linen woollen and light cloths are the principal manufactures, with silk and rayon taking a secondary position (see pp. 233–43).

The exploitation of potash mines around Mulhouse, especially towards the forest of Nonnenbruch, about 11 km. to the north-west, at the beginning of this century, brought further prosperity to the town (see pp. 226–7 and Plate 58). About twenty mines in the neighbourhood are connected with the Colmar-Mulhouse railway. The largest of these, the former German-owned *Mines Domaniales de Potasse d'Alsace*, situated about 5 km. to the south-west and covering an area of about 38,500 ha., were purchased by the state for 208 million francs in 1924, and they produce more than two-thirds of the total potash output of France. The *Mines de Kali Sainte-Thérèse* extending east of Ensisheim, about 20 km. to the north of Mulhouse, were opened in 1910 and have the second largest output.

The chemical industries of Mulhouse include the electrolysis of potash salts, and the manufacture of aniline and other dyestuffs. The *Société Alsacienne d'Explosifs* has extensive plants at Richwiller, 6 km. to the north-west, and quantities of magnesium are produced by the *Fabriques de Produits chimiques de Thann et de Mulhouse* at Thann.

The *Société Alsacienne de Constructions mécaniques*, established by André Koechlin in 1839 and with works at Mulhouse, is the dominant combine for the building of locomotives and rolling stock in France (see p. 211).

The growth of industries during the nineteenth century was accompanied by pioneer work in workers' welfare. The powerful *Société Industrielle de Mulhouse* inaugurated the building of impressive artisan residential blocks (*cités ouvrières*) on each side of the canalized Ill, to the north and north-west of the town. Dornach, an industrial suburb to the west, was attached to the administrative district of Mulhouse in 1914.

Communications

The commercial relations of the neighbourhood have been greatly facilitated by the communications converging on Mulhouse. In addition to local lines up to the Vosges and across the Rhine plain, the main railway routes are the Basle-Mulhouse-Colmar-Strasbourg line and the line from Mulhouse to Belfort, diverging thence for Paris or the Rhône valley.

The chief road routes are north to Colmar for Strasbourg (R.N. 422 and 83); south-east to Basle (R.N. 66); north-west to Neufchâteau

(R.N. 66); and south-west to Belfort (R.N. 466A) for the Basle-Chaumont-Paris road (R.N. 19) or the south of France.

The Rhône-Rhine Canal flowing through Mulhouse, together with the canalized rivers Ill and Doller, brings cheaply transported coal to the industrial works in the neighbourhood.

NANCY (pop. 121,301)

General Features

Nancy, ancient capital of the duchy of Lorraine and chief town of the department of Meurthe-et-Moselle, is situated at an altitude of 200 m. near the left bank of the Meurthe, where the river approaches the Oolitic limestone escarpment. The town is built at the entrance to the short gap between the main edge of this escarpment and a small outlier of the limestone formation. To the west is the Forêt de Haye and beyond the Meurthe, to the east, are the hills of Essey and Malzéville. The present formation of the town is a result of the union of two separate townships—the *ville-vieille*, which developed around the ducal palace and the church of St Epure, and the *ville-neuve*, built in 1587, which is delimited by the Place Stanislas and the gates of St Georges, St Nicolas and the Place St Jean.

Nancy has been an episcopal see since 1777; it is the headquarters of the Twentieth Army Area, and the administrative centre of the Fifteenth Economic Region consisting of the Chambers of Commerce of Charleville, Sedan, Châlons-sur-Marne, Reims, Bar-le-Duc, St Dizier, Nancy, Epinal, St Dié, Metz and Troyes. The Court of Appeal for the departments of Meurthe-et-Moselle, Meuse, Vosges, and Ardennes sits in the town. The 'academy' of Nancy includes the departments of Meuse, Meurthe-et-Moselle and Vosges. The university, transferred from Pont-à-Mousson in 1769, is one of the most famous in France, and it was among the first in France to develop applied science in the later nineteenth century: for example, it established laboratories for the study of brewing methods (see vol. II, p. 263). The *Ecôle de Nancy* specializes in glass designing. Since 1941, Nancy has been the principal town of a region formed by the departments which constitute the area of the Court of Appeal.

History

Nancy became the home of the dukes of Lorraine in the twelfth century when it was a small trading settlement. The thirteenth and fourteenth centuries were a period of considerable development, and many religious houses were founded. The town walls were extended towards the north, and the two suburbs of Haut-Bourget and Petit-Bourget were included within the boundary towards the end of this period. Charles the Bold besieged and captured Nancy in 1475 in an attempt to establish direct contact between the duchy of Burgundy and his Flemish possessions. The town was restored to the dukes of Lorraine in 1476, and a year later Charles was killed outside the walls during another attempt to storm the city (see vol. II, p. 62). The sixteenth century brought great cultural prosperity to Nancy. In the latter half, owing to the growth of population, the duke Charles III founded the *ville-neuve*, with rectangular streets and separately fortified from the old town. Nancy experienced a series of disasters in the seventeenth century: in 1633, Charles IV was expelled from his duchy by the French king. When the duchy was restored in 1697 under the Treaty of Ryswick, the king was given the right to dismantle the fortifications of Nancy, which remained an open town until modern times. The new duke Leopold was a great admirer of Louis XIV and did much to enrich Nancy—the cathedral was built between 1703 and 1742. In 1736, Stanislas, a former king of Poland, became duke of Lorraine; he demolished the ramparts separating the two *villes*, replacing them with buildings of outstanding architectural merit—the Place Stanislas is remarkable in this respect. After the death of Stanislas in 1766, Lorraine was reunited to France, and Nancy became the seat of an *intendant*, or provincial commissioner, and of the 'parlement' of Lorraine (see vol. II, p. 89). It was occupied by the Germans between 1870 and 1873; again, in September 1914, the German army approached the outskirts, and the town was heavily bombarded.

Economic Development

Its position at the apex of the Lorraine iron-ore plateau and the facilities of its railway communications have been the major causes of Nancy's modern development. The population increased from about 30,000 to over 170,000 (including suburbs, e.g. Malzéville 3 km. to the north, and Jarville 2·5 km. to the south) between 1800 and 1936 (see Fig. 26). Finished iron and steel products are more extensively manufactured in the Nancy neighbourhood than elsewhere in the Lorraine orefield (see pp. 196–201 and Fig. 72). The most important industrial concerns in the vicinity are metallurgical and mechanical. The former extend through Frouard and Pompey, 10 km. to the north of the town, as far as the extensive works of the

Société Anonyme des Hauts-Fourneaux et Fonderies de Pont-à-Mousson, 18 km. farther north; to the south-west they reach Neuves-Maisons, 12 km. from Nancy, on the Est Canal. The mechanical industry covers light engineering, electrical equipment, electric locomotives, and heavy locomotive repairs (see p. 211); the major concerns are those of the *S.A. Mécanique Moderne* in the northern part of the town, the *Usines Pantz*, the *Cie Lorraine d'Electricité*, and factories belonging to 'Alsthom' (*Société Générale de Constructions electriques et mécaniques*).

The rich salt content of the Lorraine clays has led to the opening of extensive salt mines and soda works around Nancy (see p. 227). The chief salt mines are those at Dombasle, Rosières and Varangéville to the south-east. Sodium carbonate, caustic soda, soda crystals and bicarbonate of soda are produced at the *Solvay* works at Dombasle, and by *Daguin et Cie* at La Madeleine. One of the most important aerial ropeways in France runs from Dombasle to Nancy.

The Triassic rocks and gypsum content of the water in Lorraine have helped to establish the brewing industry at Nancy. There are large breweries in the town and in the suburb of Maxéville, with barrel making as a subsidiary activity. Textiles (cotton and embroidery), glass (from local sands), especially glass painting and engraving, hats, leather, boots and shoes, modern furniture and musical instruments are also manufactured on a large scale, while the *Grands Moulins Vilgrain* at Essey, 3 km. to the east of the town, are leading producers of foodstuffs.

Communications

Nancy plays a vital part in the eastern region of the S.N.C.F. The main lines are Nancy-Châlons-Paris, thence across the Col de Saverne to Strasbourg, and Nancy-Metz-Luxembourg, branching thence for Dijon and for Belfort. The most important road routes are: west to Paris via Vitry-le-François and either Châlons or Sézanne (R.N. 4, 34 and 3); east to Strasbourg (R.N. 4); north either to Thionville and Luxembourg (R.N. 57); north-east to Saarbrücken (R.N. 74); south along the Moselle to Epinal and Belfort (R.N. 57); and south-west to Neufchâteau for central France (R.N. 74).

A branch of the Est Canal, 10 km. in length, runs from near Messein to the Marne-Rhine Canal at Nancy, which, with the canal port at Maxéville, handles annually about half a million tons of freight, chiefly exports of iron ore to the Saar and pig-iron to the upper Marne, as well as cement, soda, salt, timber and building stone. The main water-borne import is coal from Belgium, via the Ardennes and the Est Canal, and from Strasbourg via the Marne-Rhine Canal.

There are airports at Malzéville and at Essey.

NANTES (pop. 195,185)

Chief town of the department of Loire-Inférieure and the seat of a bishopric in the ecclesiastical province of Tours. Administrative centre of the Fifth Econonic Region formed by the Chambers of Commerce of Laval, Le Mans, Nantes, St Nazaire, Cholet, Angers, Saumur, Tours and La Roche-sur-Yon. Headquarters of the Eleventh Army Area and of the *Inscription Maritime* for the departments of Finistère (part), Morbihan, Loire-Inférieure, and Vendée (part).

See vol. IV, pp. 113–22.

NICE (pop. 241,916)

Chief town of the department of Alpes-Maritimes and the seat of a bishopric in the ecclesiastical province of Aix. State broadcasting station.

See vol. IV, pp. 206–10.

NÎMES (pop. 93,758)

General Features

Nîmes, chief town of the department of Gard, is situated at the foot of the limestone uplands of the *garrigues* on the southern edge of the hilly country of the Cévennes. A ridge of the *garrigues* rises from an altitude of 115 m. at *Tour Magne*, the former Roman tower immediately to the north-west of Nîmes, to over 200 m. farther north, and it forms a semicircle running north to west behind the town.

Nîmes is the seat of a bishopric in the ecclesiastical province of Avignon, and the Court of Appeal for the departments of Ardèche, Gard, Lozère and Vaucluse holds its sessions here.

History

The Gaulish town of Nîmes was built close to the spring which emerges from below the bluff of Mont Cavalier to the north-west, and flows around the town. At the close of the first century B.C., a military colony was established here by Augustus; later, Agrippa considerably enlarged the town and built the public baths. The town gradually became one of the most attractive in the Roman Empire; it was famed for its walls, which had a circumference of 6,000 m., its temples, its capitol (the *Maison-Carée*), and its thermal baths. By the end of the second century A.D., Nîmes had established its importance as a stronghold and a centre for trading with the Roman ports on the Mediterranean. Between the fourth and ninth centuries, the town passed in turn into the hands of Visigoths, Saracens and Franks, before finally becoming a part of the kingdom of Aquitaine (see vol. II, p. 41). From the tenth to the thirteenth centuries, Nîmes was held by vassals of the counts of Toulouse. It became a stronghold of the Albigensian heresy before it was attached to the French crown in 1229 (see vol. II, pp. 51–2). The religious wars of the sixteenth and seventeenth centuries left a deep mark on the town, which had an active Protestant element, and many Catholics were massacred in 1567. After the Revocation of the Edict of Nantes, the majority of the Protestants left Nîmes, several of them joining the Camisards in the Cévennes. The medieval town was entirely rebuilt before the beginning of the eighteenth century, but its Roman remains are still excellently preserved (Plate 67).

Economic Development

A colony of Italian merchants, who settled at Nîmes towards the close of the Middle Ages, introduced a flourishing textile industry. This prosperity, however, did not survive the disastrous religious wars and the Revocation of the Edict of Nantes. The working of the Alès coalfield, 40 km. to the north (see p. 187), has helped the modern revival of industry at Nîmes. There are flourishing woollen, calico printing and silk works in the town, as well as important tanneries. Foundries and mechanical construction yards produce motor carriages, tractors and other agricultural machines: there are also small industries dealing with plaster, cement, furniture and foodstuffs. Nîmes is the chief cattle market for the Midi and one of the leading centres of the wine trade for southern France.

Communications

The main railway line for passenger traffic from Nîmes crosses the Rhône at Tarascon. A line runs south-west to Sète and the Spanish frontier, another north-west to the Alès coalfield, then winding up the Cévennes scarp to the head of the Allier valley, and on to Clermont-Ferrand.

The primary road routes are: north to Alès for Le Puy, Moulins and Paris (R.N. 106 and 7); north-east through Avignon for Valence and Lyons (R.N. 87, 86 and 7); south-west to Montpellier for Narbonne and the Spanish frontier (R.N. 87 and 9); south-east to Aix-en-Provence for Marseilles and the Riviera (R.N. 99, 8 and 7).

REIMS (pop. 116,687)

General Features

Reims, in the department of Marne, is situated at an altitude of 86 m. on the right bank of the river Vesle, a tributary of the Aisne. The town stands slightly to the north of the Montagne de Reims (over 250 m.), the highest section of the Tertiary scarp of the Falaise de l'Ile de France. On the lower slopes of the scarp, between Reims and Epernay to the south, are the Champagne vineyards. To the east, Reims faces the chalk country of the *Champagne Pouilleuse.*

The older part of the town is grouped around the fourteenth-century cathedral, although there was an earlier settlement in the south-east, around the abbeys of St Remi and St Nicaisse. The town took its present form in the seventeenth century, with further expansion during the nineteenth.

History

Reims belonged to the tribe of the Remi in Gallo-Roman times, and became the most important centre of Belgic Gaul. Its archbishopric was created in the third century A.D., and Clovis was baptized here in 496. Up to the twelfth century, the temporal powers were held by the archbishops. With a few exceptions, all the kings of France, from Philip Augustus in 1180 to Charles X in 1825, were crowned in the cathedral. In 1429, Joan of Arc presided over the coronation of Charles VII at Reims (see vol. II, p. 59). Its university was founded in 1547.

The Germans entered Reims in September 1914, and the cathedral was burnt. With the eviction of the Germans after the first battle of the Marne, the town formed an important salient against which German divisions threw themselves; it was heavily attacked and suffered great damage. In 1918, the battle-line again approached 3 km. to the east and 4 km. to the north of Reims. The cathedral was completely restored in 1938.

Economic Development

With Epernay, Reims is the chief centre for the Champagne wine industry. About 3,000 people are usually employed at Reims, where the most important firms are *Pommery*, *Bollinger*, *Cliquot-Ponsardin*, *Heidsieck* and *Goulet*. There are vast caves in the chalky slopes of the Montagne de Reims, which provide the constant temperature necessary for the various maturing processes (see p. 116 and Plate 21).

The textile industry at Reims dates from the twelfth century when its famous fairs were inaugurated. Wool combing, spinning and weaving are carried out, with flannel manufacture outstanding (see p. 236 and Figs. 83, 84). Over 20,000 people are normally engaged in this industry, and great quantities of wool are obtained from the large flocks of merino sheep pastured on the *Champagne Pouilleuse*. Biscuit manufacturing has long been established in the town. Metallurgical foundries, glass works and sugar refineries also are situated here. Coal for the woollen mills and iron for the metallurgical works are brought by water, as well as sand for the glass works from Messein.

Communications

Reims belongs to a series of settlements originally located at or near the foot of the Tertiary escarpment (see vol. IV, Fig. 107). It had the additional advantage of being situated at the mouth of one of the numerous river-gaps through this escarpment and in consequence, at an early date, it became a route centre of considerable importance. It was a converging point for two major highways in Gallo-Roman times—one from Lyons and Provence to Belgium, the other, following the Vesle valley through Soissons, connecting the Channel ports with the Swiss frontier. To-day it is a railway junction of considerable importance; the main lines are: Paris-Reims-Mézières; from the Channel ports to Switzerland, via Laon, Reims and Châlons; an alternative route to Paris via Epernay; and the Reims-Verdun-Metz line.

The principal road routes diverging from the town lead south-west to Château-Thierry for Paris (R.N. 380 and 3); west to Rouen via Soissons and Beauvais (R.N. 31); north-west to Laon, St Quentin and Arras, thence either to Lille and Belgium or to the Channel ports (R.N. 44); south to Châlons and Troyes for either Dijon and Lyons, or for Moulins and south-western France (R.N. 44, 77 and 71); east to Verdun and Metz, thence to either Saarbrücken or Strasbourg (R.N. 31 and 3).

Reims is served by the Aisne-Marne Canal, which crosses the water parting of the Vesle and the Marne, linking the Aisne and Marne Lateral Canals. The town is becoming a river port of growing significance as a result of improved conditions on the canal and the installation of modern port equipment. In 1936, nearly half a million metric tons were handled, of which four-fifths were imported into the town.

RENNES (pop. 98,538)

General Features

Rennes, the former capital of Brittany and chief town of the department of Ille-et-Vilaine, lies at an altitude of 55 m. in the only extensive lowland on the Breton peninsula, at the confluence of the rivers Ille and Vilaine. The Vilaine flows east to west and divides the town into two parts. The administrative and commercial quarter, around the modern cathedral, is built on the right bank, with the station and military quarters on the left bank.

Rennes is an archiepiscopal see, the headquarters of the Tenth Army Area and administrative centre of the Sixth Economic Region, consisting of the Chambers of Commerce of Brest, Morlaix, Quimper, Lorient, St Brieuc, Fougères, Rennes, and St Malo. The Court of Appeal for the departments of Côtes-du-Nord, Finistère, Ille-et-Vilaine, Loire-Inférieure and Morbihan holds its sessions in the town. The 'academy' of Rennes includes the departments of Finistère, Côtes-du-Nord, Morbihan, Ille-et-Vilaine, Loire-Inférieure, Mayenne and Maine-et-Loire. Since 1941, it has been the principal town of a region formed by the departments of Ille-et-Vilaine, Côtes-du-Nord, Finistère and Morbihan. A state broadcasting station operates here.

History

The history of Rennes begins in Gaulish times, when it was the capital of the Redones tribe, but its political supremacy as chief town of the duchy of Brittany was not established until the tenth century. The duchy was joined to the French crown by Francis I, in 1532 (see vol. II, p. 61), and Brittany became a province, with its parliament meeting alternatively at Nantes and Rennes until 1561, when it became definitely settled at the latter town. The seventeenth and eighteenth centuries brought recurrent disasters and unrest to Rennes; in 1632, it was devastated by plague, and in 1675, when the citizens were in revolt against tobacco and paper duties, the Breton 'parlement' was forced to remove to Vannes. In 1720, three-quarters of the town was destroyed by a fire which lasted for a week, and there was renewed insurrection in 1765. The ravages of the great fire were gradually repaired, and, despite its marginal position, Rennes recovered its consolidating influence as the capital of Brittany. The university of Rennes, through its Faculty of Letters, has been a powerful factor in the preservation of Breton language and literature.

Economic Development

The Rennes basin, with its low relief, varied and rich soils, and warm climate, has become a prosperous agricultural area. Rennes serves as a market for the cereals, market-garden produce and stock raised in the region. Important branches of the leather industry are centred around the town—tanneries, the dressing of leather for export, and boot and shoe factories employ a considerable number of people. There are motor and agricultural engineering works as well as a few linen mills and chemical works.

Communications

Rennes has grown up at a point of relatively easy crossing for routes going north to south and east to west. By rail, it is served by the main line from Paris via Chartres and Le Mans to Brest, and by the line from St Malo to the lower Loire. It is also the converging point of numerous local railways. The principal road connexions are, to the east, for Laval, thence either to Alençon and Paris or to Le Mans and Orléans (R.N. 12); west to St Brieuc and Brest (R.N. 12); south-west to Lorient (R.N. 24); south to Nantes, thence to La Rochelle and Bordeaux (R.N. 137); south-east to Tours via Angers (R.N. 163).

The Vilaine is navigable from Rennes to its estuary. There are extensive quays, built between 1841 and 1854, along the riverside in the town, in addition to the quays on the Ille-Rance Canal on the western side. This canal connects the Vilaine with the Rance, thus forming a second-class waterway across the Breton peninsula; water-borne traffic, however, is not heavy.

ROUBAIX-TOURCOING (total pop. 185,498)

General Features

The industrial agglomeration of Roubaix-Tourcoing in the department of Nord lies in the plain of Flanders, 11 km. to the north-east of Lille, and 2 km. from the Belgian frontier. Roubaix has 107,105 inhabitants, Tourcoing 78,393.

History

Both towns trace their development to the latter half of the eleventh century, Tourcoing being known then for its serge, velveteen and shoddy production. Roubaix was granted a commercial charter in 1496, while Tourcoing was given the privilege of a free market in 1491. Since the seventeenth century the two towns have enjoyed great commercial prosperity. In 1762, Louis XV authorized the craftsmen of Roubaix to manufacture silk, woollen and flax products which were then being produced on an increasing scale in England. This authorization drew protests from the townspeople of Lille, and Roubaix remained content with producing coarse cloth and other material which would not clash with the commercial interests of Lille. Under the economic programme of Turgot at the end of the eighteenth century, the town gradually released itself from the commercial influence of Lille.

Economic Development

The Roubaix-Tourcoing agglomeration showed a rapid increase in population during the nineteenth century; this was, of course, a direct result of its industrial expansion (see Fig. 26 and Plates 62, 63). In recent years its textile industry has become more closely connected with that of Lille, and the Roubaix-Tourcoing-Lille textile area is the foremost in France (see pp. 233–7 and Figs. 83, 84). For cotton it held, in 1938, 29% of the total French equipment of ordinary spindles and 64% of twisting spindle equipment. Its woollen output is even greater, for in the same year the area had 80% of the total looms. The Roubaix-Tourcoing group specializes in woollen manufactures. Most types of yarns are produced, and the finished goods include carpets, underwear, and dress goods. It is the chief centre of the wool and wool-mixture hosiery industry, with a very large output of knitting wool and hosiery yarns. Tapestries and furnishing fabrics are also manufactured on an extensive scale. Considerable numbers of workers from Belgium are employed in the textile factories.

Roubaix-Tourcoing have many engineering works, rubber and chemical works and tanneries.

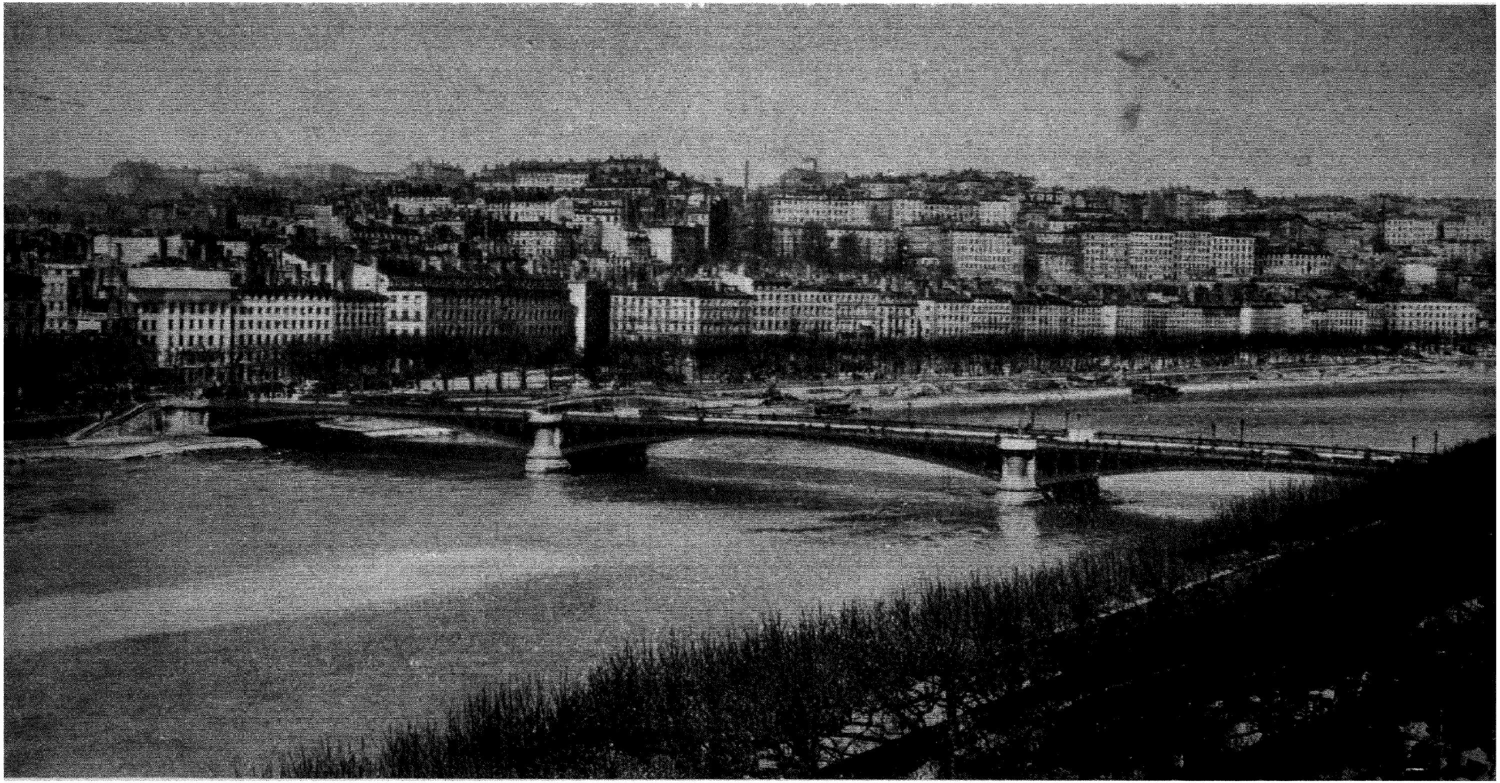

Plate 74. Lyons

A view across the Rhône, showing the Pont Morand, one of the twenty-six bridges within the city. On the farther right bank (Quai St Clair) are eighteenth-century houses backed by the hill of the Croix Rousse. On the hill slopes are great blocks of working-class dwellings, in which the weaving of silk by hand-loom is still carried on.

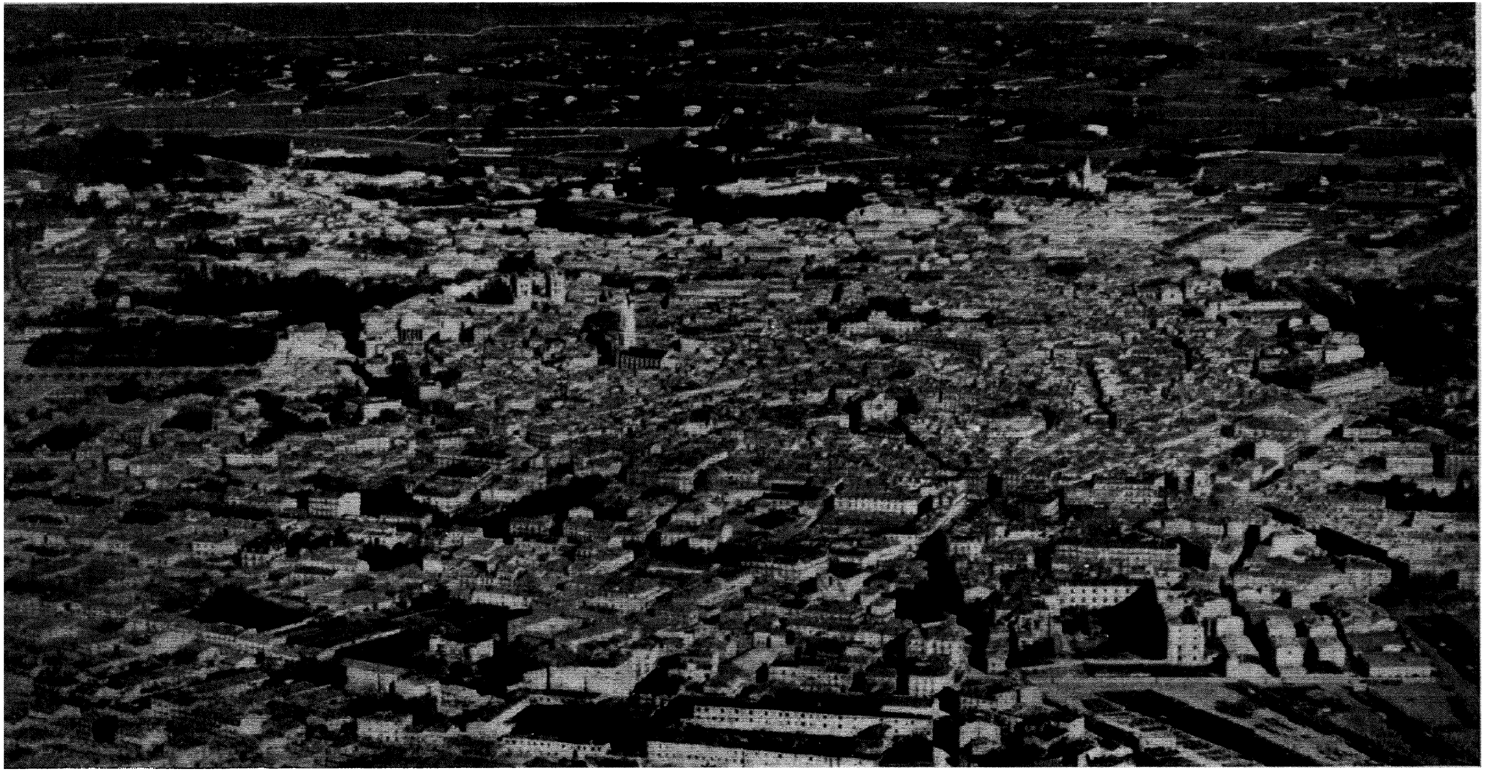

Plate 75. Montpellier

The town is situated on the plain of Lower Languedoc, part of which can be seen in the background, dotted with trees and houses. On the left is the Aqueduct St Clement, which was built in the eighteenth century to convey water to the town from the spring of St Clement, 9 km. distant.

Communications

The two towns are connected with Lille by electric tramway, and main-line railway traffic from Lille to Ostend or Antwerp goes through. The road communications of Lille also serve the area.

The Roubaix Canal connects with the Deule Canal at Marquette and runs to the Belgian frontier and on to Espierres on the Escaut in Belgium. Two branches of the Roubaix Canal connect it with the towns of Croix and Tourcoing.

ROUEN (pop. 122,832)

Chief town of the department of Seine-Inférieure and the seat of an archbishopric. Administrative centre of the Third Economic Region formed by the Chambers of Commerce of Bolbec, Dieppe, Elbeuf, Fécamp, Havre, Rouen, Le Tréport, Evreux and Pont-Audemar. Headquarters of the Third Army Area. Seat of the Court of Appeal for the departments of Eure and Seine-Inférieure. Since 1941, the principal town of a region composed of the departments of Seine-Inférieure, Eure, Calvados, Manche and Orne.

See vol. IV, pp. 51–62.

ST ETIENNE (pop. 190,236)

General Features

St Etienne, the seat of a bishopric and chief town of the department of Loire, is situated at an altitude of 500 m., in the valley of the Furens, which flows west, entering the Loire as it turns northwards into the *plaine du Forez*. The country around St Etienne forms a depression in the eastern edge of the Central Massif, separating the Vivarais from the Mts du Lyonnais, and the basin contains valuable outcrops of coal-bearing rocks.

The immediate environment of the town is essentially industrial. The hilly country surrounding it, except for the slopes of Mt Pilat to the east, is marked by pit-heads, chimney stacks and groups of artisan suburbs (Plate 51).

History and Economic Development

The history of St Etienne has been closely interwoven with its industrial development. Its coalfield is the third largest in France and has served as a basis for metallurgical, silk and cotton industries (see pp. 187, 204, 239 and Fig. 68). As far back as the twelfth century, small quantities of coal were dug out of surface outcrops, but it was not until the end of the eighteenth century that the industry was extensively developed. An indication of the industrial expansion of St Etienne itself is given by the population statistics: in 1830, there were 45,000 inhabitants, 96,600 by 1866 and 191,000 in 1921 (see Fig. 26). The scientific working of the mines was begun about 1810, and six years later the foundations of the well-known *Ecole des Mines* were laid. In 1936, the output of coal and anthracite from the St Etienne basin totalled 3,241,000 metric tons. The chief mining concerns, employing about 22,000 people, are the *Houilleries de St Etienne*, the *Mines de Roche-la-Molière et Firminy* (10 km. to the south-west), *Mines de Montrambert et la Béraudière* and the *Mines de la Loire*. Some of the coal makes excellent coke for metallurgical purposes, and in 1936 over 100 coking ovens had been installed at St Etienne with a capacity of 500 tons per day. The output of coke for that year was 123,100 tons.

The metallurgical industry of St Etienne is both varied and important. The first steel works in France were erected in 1815 by an Englishman named Jackson at Le Chambon, 6 km. to the west. In recent years the iron and steel works of the area have played a vital role in French industrial life. Almost the entire French output of crucible steel comes from the St Etienne and Le Creusot basins (see p. 204). The most important works are *Forges et Aciéries de la Marine et d'Homecourt*, *Aciéries de St Etienne*, *Aciéries de Firminy* and the *Hauts Fourneaux de Chasse*.

Numerous important engineering industries have developed parallel with the iron and steel industry, and St Etienne is the chief producer of armaments in France. Its corporation of armourers dates from the thirteenth century, while the extensive manufacture of firearms began in the sixteenth century. Small firearms are made both by large firms and individual gunsmiths; the production of heavy armaments is dominated by the *Manufacture Nationale d'Armes de Guerre* employing over 10,000 hands; its works are situated between the Boulevard Thiers and the Rue de Roanne in the west of the town.

St Etienne is famous for its manufacture of motor cycles, bicycles and their accessories. The *Chambre Syndicale de l'Industrie des Cycles et Automobiles* controls several works in the town. Textile machinery and aero-engines are constructed here, and there are steam locomotive works at St Chamond, 9 km. to the north-east (see pp. 211-12).

The silk industry of Lyons has extended along the Gier valley to the Loire basin at St Etienne, and the manufacture of silk ribbons has been a specialized craft in the town since its introduction by Gayotti from Bologna in the fifteenth century. As in Lyons, a considerable amount is manufactured by craftsmen in their own homes, but the expansion of electrically driven looms has tended to diminish the number of workers operating domestic hand-looms. In 1936, the spinning and weaving of silk and rayon together with a certain amount of fine cotton working gave employment to about 57,000 workers in the St Etienne area (see p. 240).

St Etienne has become an assembling and commercial centre for the silk textile industry, although in turn it is a tributary to the larger Lyons centre, 56 km. away.

Several chemical works have been established around the town to exploit various mineral by-products. There are installations for the distillation of tar, the manufacture of synthetic ammonia, and the recovery of methanol, in addition to plant for the manufacture of slag cement, and a station to compress rich gas for road-traction purposes.

Communications

The St Etienne depression is drained eastwards by the Gier and westwards by the Furens; it thus provides easy passage for road and railway communications. The line opened in 1828 between St Etienne and Andrézieux, 15 km. to the north-west, was the first railway to be constructed in France. The most important rail routes out of the town are: along the Gier valley to Givors for Lyons or Marseilles; to Roanne for Paris; to Clermont-Ferrand; and to Le Puy. The major road communications are: north to Roanne and Nevers for Paris (R.N. 82 and 7); north-east to Lyons (R.N. 88); south-east to Valence and Avignon for either Nîmes and Narbonne or Marseilles and the Riviera (R.N. 82); and south-west for Le Puy and Toulouse (R.N. 88).

STRASBOURG (pop. 193,119)

General Features

Strasbourg, the historical capital of Alsace and chief town of the department of Bas-Rhin, is situated at an altitude of 145 m. on the river Ill, 4 km. from the left bank of the Rhine. The town stands in the plain of Alsace, which forms the south-western section of the Rhine rift valley and includes the eastern slopes of the Vosgian foothills. This open loess plain descends in a gentle terrace to the marsh plains or *Ried* of the Ill and the Rhine. A fairly high and dry terrace stretches between the *Ried* lands of these two rivers and forms a natural causeway which an old route has followed. Strasbourg stands away from the unreclaimed Rhine marsh plain (see vol. I, p. 52).

The town is traversed by river channels and canals. The Ill flows from south-west to north-east, and divides into two channels, encircling the island on which the old town is built. Upstream, the Ill receives the Bruches, one of its eastern Vosges tributaries; near the Port de Schirmeck it connects with the Rhône-Rhine Canal. Downstream it is joined by the Aar. To the north-east, the Marne-Rhine Canal debouches into a junction canal which connects it with the main Rhine by way of the Avant-port. Thus, although Strasbourg owes most of its importance to its position close to the Rhine, the town itself grew up on the banks of the Ill.

Strasbourg is the seat of a bishopric (since 1871, under the direct supervision of the Holy See) and has a military governor. In 1939, the headquarters of a new Army Area were established in the town which is the administrative centre of the Sixteenth Economic Region consisting of the following Chambers of Commerce: Colmar, Mulhouse, Strasbourg, Besançon, Belfort, Gray and Lure. The 'academy' of Strasbourg includes the departments of Moselle, Bas-Rhin and Haute-Rhin. The university was founded in the sixteenth century A state broadcasting station operates from the town. (For the administrative function of Strasbourg since June 1940, see vol. II, Appendix II.)

History

In Roman times Strasbourg was known as Argentoratum. From a small community of fishing folk it grew into an important military settlement with a residential suburb on the island formed by the river branches, and it commanded the major highways from Reims and Mainz. The town was captured by the Franks in the fourth century, and in the sixth century it became known as *Stratisburgo*, 'the fort on the road'; from the fourth century onwards, the town was under episcopal control. It became an imperial city in 1205. Its Gothic cathedral was built between the end of the twelfth century and the first half of the fourteenth century (Plate 69). There were many struggles between bishops and burghers until 1262, when the latter were granted their independence of the see. In 1332, all the free citizens were given a share in the government. Strasbourg grew rapidly—in 1336, its first annual fair was held—and by the end of the fifteenth century it was the chief town in Alsace; its reputation as a seat of culture and learning was considerably enhanced during the

Renaissance. The Reformation saw the town becoming a Protestant centre with a very strong French Huguenot element. At the close of the Thirty Years' War, French influence became increasingly stronger until its annexation by France in 1681, and the town fortifications were rebuilt under Vauban (see vol. II, pp. 89 and 91). In 1871, under the Treaty of Frankfurt, Strasbourg became German and remained so until 1918.

Economic Development

A variety of important industries is based on Strasbourg. Its engineering industry dates back to 1857, when the *Usine de Graffenstaden* was established. After the Franco-Prussian war of 1870–1, the Koechlin company at Mulhouse and the works at Graffenstaden were amalgamated to form the *Société Alsacienne de Constructions mécaniques* with new works at Belfort. Since 1924, the works at Graffenstaden have concentrated on the building of steam locomotives. There are other establishments in the suburbs of Neudorf and Schiltigheim, making refrigerators, equipment for breweries, flour mills and other factories. The general engineering works include those of Matford, the French branch of the Ford combine. Boilers, steam engines, light railway material, and electrical apparatus are made, while inland waterway vessels are constructed on a large scale.

The town has several chemical works, manufacturing drugs, artificial manures, candles, soap and perfumes. A cellulose works produces about 20,000 tons annually, and within recent years a rayon factory has been set up. The working of the oil wells in Bas-Rhin has led to the establishing of the *Ecole Nationale du Pétrole* and the building of a small oil refinery in the town. Flour mills for both local and water-borne grain have been built within the last few years. Coal for the local power station and for the manufacture of gas and coke is cheaply brought from the Ruhr and the Saar valleys.

Strasbourg is a busy market for the produce of the wholesale market gardening which flourishes both on the loess belt and on the marshy clay of the Ill valley. Foodstuffs, too, are of considerable importance; fruit and vegetable preserves, as well as *paté de foie gras*, being specialities. There are large breweries and distilleries in and around the town. The sandy soil of the neighbourhood has favoured the growing of tobacco since 1620, and the national tobacco monopoly has one of its largest warehouses at Strasbourg. Several tanneries, paper mills and printing works are located in the area.

Strasbourg is the sole inland waterway port in eastern France and the largest inland port in the country. During the Middle Ages, the Ill was navigable upstream to Sélestat and Mulhouse. In the fifteenth and sixteenth centuries, wines from Alsace were shipped from Strasbourg for Cologne and England. Throughout the eighteenth century, there was constant traffic between Strasbourg and Basle, which was considered a 'free' port. Then, in the nineteenth century, Strasbourg became a canal port, situated at the junction of the Ill and the Marne-Rhine and Rhône-Rhine canals. The straightening and dredging of the Rhine channel had resulted in Mannheim becoming the really effective head of navigation, but attempts were made towards the end of the last century to link Strasbourg with the Rhine. In 1892, the Bassin du Commerce and the Bassin d'Austerlitz were completed. Further developments begun in 1907 were completed in 1927: two junction canals leading directly from the new river port were added to the Ill; a depth of 2 m. was secured between Strasbourg and Sonderheim; new basins were built—the Bassin des Remparts in 1926 and the petroleum basin in 1927. Further extensions were begun in 1928, including the construction of the 'Nouveau Port', above the Petit-Rhin confluence. These improvements were designed to enable 10 million tons of traffic to be handled annually. At present the port area extends east and north-east of the town, facing the port of Kehl, which was opened in 1897. Traffic at Strasbourg expanded rapidly after the return of Alsace to France, and in 1924 it became an autonomous port, and the head of Rhine navigation. Its trade was in some respects handicapped by administrative regulations which were designed to assist the French maritime ports against Dutch and Belgian ports, but there was considerable expansion between 1925 and 1936; in the latter year nearly 7½ million metric tons of traffic were handled, over 5 million of these being river traffic. There was a slight decrease, especially in transhipment traffic, after 1936, due partly to the unfavourable conditions for navigation on the waterways serving the port, and partly to the improved conditions on the Rhine, which enabled large vessels to proceed direct to Basle without transhipping their cargoes into smaller barges at Strasbourg (see further, vol. IV, pp. 406–8 and Fig. 117).

Its main imports, which in 1938 exceeded its exports, are coal, cereals and oils. Nine-tenths of the French potash mined for export goes through Strasbourg, which is about 80 km. north-east of the mines; the potash is sent by water to Antwerp, thus avoiding the high cost of rail transport to Dunkirk. Iron ore is the other outstanding export, but shipments were much reduced after 1938, mainly owing to a reduction in German purchases.

Communications

The chief railway communications of Strasbourg are: through the Col de Saverne to Saarbourg, thence west via Nancy to Paris or north-west to Lorraine, the northern coalfield and the Channel ports; the main north-south line, following the Rhine, from Mainz and Mannheim, for Mulhouse, then to the Rhône valley or Switzerland; across the Rhine to Kehl, thence to Stuttgart; and the recently constructed trans-Vosgian line to St Dié and Epinal.

Strasbourg is an important focus of major road routes: west across the Saverne to Nancy and Paris (R.N. 4); south to Belfort, thence either to Basle or to Besançon for central and south-eastern France (R.N. 83, 19 and 73); north to Lauterbourg (R.N. 68); and east across the Rhine to Carlsruhe and Fribourg.

TOULON (pop. 150,310)

Seat of a sub-prefecture in the department of Var and the headquarters of a sub-division of the Fifteenth Army Area, with headquarters at Marseilles.

See vol. IV, pp. 200–6.

TOULOUSE (pop. 213,220)

General Features

Toulouse, former capital of Languedoc, seat of an archbishopric and chief town of the department of Haute-Garonne, is situated at an altitude of 140 m., on the right bank of the river Garonne near its junction with the Midi Canal which curves to the east and north of the town. The river turns northwards at Toulouse. The town stands at the entrance to the deep valleys of the Garonne and Ariège; to the east, it is flanked by the south-western edge of the Central Massif. On the left bank of the Garonne is the lowlying suburb of St Cyprien which from time to time has suffered severely from inundations. A long line of boulevards extending between the canal and the city marks the site of the old city walls. Beyond them are the modern quarters of Arnaud-Bernard, St Aubin and Matabiau. In the centre of the city stands the *Place du Capitole*, on to which converge streets from every side. North of this square stands the church of St Sernin which was consecrated in 1096, and is the largest Romanesque basilica in existence.

Toulouse is the headquarters of the Seventeenth Army Area and the administrative centre of the Ninth Economic Region, formed by the Chambers of Commerce of Cahors, Montauban, Albi, Castres, Mazamet, Tarbes, Toulouse and Foix. The Court of Appeal for the departments of Ariège, Haute-Garonne, Tarn and Tarn-et-Garonne holds its sessions in the town. The 'academy' of Toulouse includes the departments of Lot, Aveyron, Tarn, Tarn-et-Garonne, Gers, Haute-Garonne, Hautes-Pyrénées, Ariège. The university plays a vital part in the cultural life of south-western France and is famous for its school of law. In 1941, the departments of Haute-Garonne, Tarn, Tarn-et-Garonne, Lot, Lot-et-Garonne, Ariège, Gers, Hautes-Pyrénées, Basses-Pyrénées (part), Landes (part), and Gironde (part) were grouped to form a region with Toulouse as its principal town. The broadcasting station at Toulouse is state controlled.

History

A Roman trading centre seems to have been established near Toulouse (Tolosa) before the town became the capital of the extensive Visigothic kingdom early in the fifth century. A century later, Clovis captured the town which retained its position as the chief city of southern France under the Merovingians. The kingdom of Aquitaine was formed in the latter half of the eighth century, with Toulouse as its capital. Between the ninth and tenth century the town suffered at the hands of various invaders. The line of the counts of Toulouse, founded towards the end of the ninth century, had done much to consolidate the town's importance, when, at the close of the twelfth century, it became the chief centre of the Albigensian heretics (see vol. II, pp. 43 and 51). Early in the thirteenth century the university was founded, largely to counter the spread of the heresy. Then, when the crusade of 1209 had become a fierce war and southern France was laid waste, Simon de Montfort was killed while besieging the town. Towards the middle of the century, the domains of the counts were seized by the French king. The 'parlement' of Languedoc was established at Toulouse in 1443, and its role in the life of southern France equalled that of Paris in the north. During the religious wars of the sixteenth century a strong Protestant element arose in the town, and later there was bitter persecution after the Revocation of the Edict of Nantes in 1685. It was upon Toulouse that Marshal Soult retreated from his Peninsular campaigns in 1814, to be defeated by Wellington to the north-east of the town.

Economic Development

Toulouse is an important commercial and industrial centre of the south-west (see p. 177). It serves as a market for the produce of the agriculture which flourishes on the Tertiary limestone soils of the Garonne valley: the hard wheat of Montauban, the fruit of the Agenais orchards and the plains of Mures, Castres and Albi, and the wines of western Languedoc. There is considerable market gardening on the north and south of the town, with special attention to the growing of *cornichon* (gherkins). The fine textile manufactures of the Hers valley are also provided with an entrepôt at Toulouse.

The development of hydro-electric power along the upper Adour, Garonne and Ariège has helped the expansion of armament, chemical and engineering industries in the town. Of the former, the most important are the various branches of the *Manufacture Nationale d'Armes de Guerre*; they are (i) the *Cartoucherie* for the manufacture of small-arm ammunition, (ii) the Arsenal for the repair and maintenance of arms and equipment, as well as the manufacture of artillery shells, (iii) the state explosives factory at Empalot, a southern suburb of Toulouse (nearby is the *Poudrerie de Braqueville*) and (iv) the *Office National Industriel d'Azote*, producing nitric acid, synthetic nitrogen, sulphuric acid and nitrogenous fertilizers. Farming implements, cycles, and factory equipment are the chief engineering products. In recent years, Toulouse has become one of the leading producers of aeroplanes—the works of the *Société Latécoère* and the *Société des Avions Dewoitine* are two of the most important in France.

The town has a considerable trade in hides and skins; special attention to scientific processes is given at the *Ecole Pratique des Cuirs et Peaux*. Other extensive industrial activities deal with tobacco, timber, flour, paper, bricks and tiles, boots and shoes. Foodstuffs form a specialized branch of manufacture in the town.

Communications

Toulouse is an important centre of communications. The gap of Naurouze, to the south-east between the Montagne Noire and the Pyrenean foot-hills, has for centuries formed a corridor between Aquitaine and Languedoc; to-day both rail and canal follow the gap. Routes from the Pyrenean passes, from Bordeaux and from Carcassonne meet in the town. The main railway lines are: Paris-

Orléans-Limoges-Toulouse-Narbonne and the Mediterranean; north-eastwards via Montauban to Bordeaux; south-westwards to Tarbes and thence to the Spanish frontier at La Tour de Carol. Toulouse is also a focus of local railways.

The principal road routes are: north via Montauban, and Cahors to the great junction of Brive, thence diverging to Brittany, Paris and the upper Loire (R.N. 20); north-east to Albi for Clermont-Ferrand or Lyons via Le Puy (R.N. 88 and 9); north-west to Bordeaux (R.N. 20, 127 and 10); south-west to Luchon and the Spanish frontier (R.N. 125) or south-east, again to the Spanish frontier via Foix (R.N. 20).

The Midi Canal, a second-class waterway, which was opened in 1681, joins the Garonne and the Garonne Lateral Canal at Toulouse, thus connecting the town with the Mediterranean at Sète. The Garonne Lateral Canal runs parallel to the river from Castet to its junction with the Midi Canal at Toulouse. A project to build a ship canal between the Mediterranean and the Atlantic via Toulouse has been discussed many times (see vol. IV, p. 428).

Toulouse is the terminus of the air service between France, Casablanca and South America; passengers and mail leave from the airport at Francazal, 6 km. to the south-east, which is a mixed civil and military aerodrome although originally intended as a military port. Recently, the Toulouse Chamber of Commerce has chosen a site near Blagnac, 5 km. to the east, with a surface of 300 ha., for the construction of an airport estimated to cost 12 m. fr.

TOURS (pop. 83,753)

General Features

Tours, ancient capital of Touraine and chief town of the department of Indre-et-Loire, is situated at an altitude of 48 m. on a level stretch between the left bank of the Loire and the river Cher, which meet 16 km. downstream. The Loire widens to about 500 m. at Tours after flowing across the limestones, sands and clays of the Paris basin. The valley of Touraine was formerly subject to serious floods, but reclamation has converted it into a rich agricultural area.

Backed to the north, on the right bank of the river, by the hills of St Cyr and St Symphorien, Tours is divided into two parts by the Rue Nationale. On the east, centred around the cathedral, is the old town; on the west, outside the former Roman wall, and grouped around the church of St Martin, is the quarter of Châteauneuf, once a medieval borough and now the commercial area of Tours. To the south-west, in the direction of the Cher, the town's modern quarters have developed.

Tours is an archiepiscopal see and the headquarters of the Ninth Army Area. The headquarters of one of the four French air commands are also established in the town.

History.

The original town was built by a Gaulish tribe on the slopes of St Symphorien, and was later transferred to the other side of the river by the Romans, who called it Caesarodunum. Towards the beginning of the fourth century it became known as *Urbs Turonum.* A strong Christian tradition had been founded around Tours in the third century by St Gatien and St Martin. In the sixth century, Gregory wrote the first history of France here, and it was at Tours, towards the end of the eighth century, that Alcuin opened the first theological and philosophical school in France. During the Middle Ages, Tours and Châteauneuf were separate boroughs, both held by the counts of Touraine. In the latter half of the twelfth century, Henry II of England, a descendant of the counts, joined Touraine to his kingdom, and the region became a theatre of war for many generations (see vol. II, pp. 54–5). When the countship was finally united to the French crown, Tours grew rapidly; in the fifteenth and sixteenth centuries it enjoyed a prosperity which became manifest, for example, in the châteaux of Touraine. The religious wars of the sixteenth century, however, seriously affected this prosperity and the town did not recover until the following century.

In 1870, as in 1940, the French government removed to Tours on its way to Bordeaux. The headquarters of the American Expeditionary Force were based here during the war of 1914–18.

Economic Development

The town's economic significance depends mainly on the agricultural produce of Touraine, 'the garden of France', with its rich farming, its vineyards and its orchards. The 'Grande Semaine de Tours', held annually from 10 to 17 May, is the chief agricultural fair in France. A small number of silk textile works recall the town's importance as a centre for the trade in the fifteenth and sixteenth centuries. Agricultural machinery is constructed in considerable quantity. The main products of the chemical works established at

Tours, chiefly by the St Gobain company, are fertilizers and pharmaceutical goods.

Communications

Tours is not an outstanding centre of railway communications. The electrified main line from Paris to Bordeaux, as well as the main-line traffic from Brittany and the lower Loire to central and southern France, go through St Pierre-des-Corps, the busy junction 3 km. distant from the town.

A heavy amount of road traffic is brought into the town along the Paris-Bordeaux route (R.N. 10), which crosses the Loire by the Pont Wilson, an eighteenth-century bridge, 435 m. long and 15 m. wide. Traffic from eastern France to Nantes goes through the town (R.N. 152), while the main routes to central and south-eastern France are either via Clermont-Ferrand (R.N. 143) or via Nevers and Moulins for Lyons (R.N. 76 and 7).

The Cher-Loire Junction Canal, which skirts the north-west of the town, is not used to any great extent.

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4. Details of the administrative and commercial importance of each town are found in *Didot-Bottin, Annuaire du Commerce* (latest edition, Paris, 1939).

5. Articles dealing with individual towns are found in various volumes of the *Annales de Géographie* (Paris, 1892–).

6. The twenty-seven sheets of the *Cartes industrielles de France*, produced since 1927 by the Société de Documentation Industrielle, give several town plans and important details regarding industrial location. The series is fully described in vol. I, pp. 249–50.

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METRIC AND BRITISH UNITS

It is customary to think of the 'metre' and the 'yard' as representing unalterable units of length. This is not so. The metre was originally intended to be the 10,000,000th part of the earth's meridional quadrant. But the accurate determination of this length proved to be extremely difficult—partly for technical reasons, and partly because of different conceptions of the 'figure of the earth'. In view of these difficulties it became necessary to define the length of the metre in terms of suitable metal bars measured under specified conditions of temperature, pressure, humidity, etc. Similar standard bars were also used to define the length of other units such as the yard. As all these metallic standards are subject to change, conversion tables differ according to the date of comparison between different bars. The tables that follow are based on the comparison between the yard and the metre made in 1895. This made 1 metre equivalent to 39·370113 inches.

The first five tables provide the ratios between units of the same kind, e.g. length, area, etc. For convenience in printing, negative powers of 10 have been used to indicate very small fractions, instead of the decimal system. Thus the figure 0·00000032 becomes $3{\cdot}2 \times 10^{-7}$; the first significant figure is the *seventh* after the decimal point. Conversely, $7{\cdot}34 \times 10^{-5}$ becomes 0·0000734.

Tables 6–18 give more fully the ratios between metric units and their equivalent British units. Metric digits (*0* to *9*) are printed in italics at the top of each table, reading horizontally from left to right. Metric tens, likewise in italics, read vertically from top to bottom on the left of the table. Thus, in Table 6, to convert *87* centimetres into inches, read *8* down on the left, then move horizontally to the right to the *7* digit column, where the answer 34·252 is read.

Metric System. List of Prefixes

Deca means ten times.	Deci means a tenth part of.
Hecto means a hundred times.	Centi means a hundredth part of.
Kilo means a thousand times.	Milli means a thousandth part of.

In abbreviations the Decametre, etc., is Dm., and the decimetre, etc., dm.

Note on 'Nautical', 'Geographical' and Statute' miles

A British 'nautical mile' is the length of the minute of the meridian at any given latitude, and is therefore a variable unit. It is given in feet for Clarke's 1880 spheroid by the formula

$$60771{\cdot}1 - 30{\cdot}7 \cos 2 \text{ Lat.}$$

This is the sea mile of the scale of latitude and distance of the Admiralty Charts. From the above formula it will be found to vary from 6,046·4 ft. at the equator to 6,107·8 ft. at the poles, being 6,077·1 ft. at latitude 45°.

The so-called 'international nautical mile' of 1,852 m. or 6,076 ft. is the length of the minute of the meridian at latitude 45° on the International Spheroid. This corresponds to the 6,077 ft. for Clarke's spheroid.

A 'geographical mile' is a fixed unit, being defined by some as the length of a minute of the equator and by others as that of the minute of the meridian at latitude 45°. According to the former definition its value on Clarke's spheroid is 6,087 ft. and according to the latter 6,077 ft. The round figure 6,080 is usually adopted for the purposes of ordinary navigation.

The British 'statute mile' measures 5,280 ft.

Table 1. *Length*

Nautical mile	Statute mile	Kilometre	Metre	Yard	Foot	Inch	Centimetre
1	1·152	1·853	1853	2027	6080*	72,960	185,300
$8{\cdot}684\times10^{-1}$	*1*	1·60934	1609·34	1760	5280	63,360	160,934
$5{\cdot}396\times10^{-1}$	$6{\cdot}21372\times10^{-1}$	*1*	1000	1093·61	3280·84	39,370·1	100,000
$5{\cdot}396\times10^{-4}$	$6{\cdot}21372\times10^{-4}$	$1{\cdot}0\times10^{-3}$	*1*	1·09361	3·28084	39·3701	100
$4{\cdot}934\times10^{-4}$	$5{\cdot}68182\times10^{-4}$	$9{\cdot}14399\times10^{-4}$	$9{\cdot}14399\times10^{-1}$	*1*	3	36	91·4399
$1{\cdot}645\times10^{-4}$	$1{\cdot}89394\times10^{-4}$	$3{\cdot}048\times10^{-4}$	$3{\cdot}048\times10^{-1}$	$3{\cdot}33333\times10^{-1}$	*1*	12	30·48
$1{\cdot}371\times10^{-5}$	$1{\cdot}57828\times10^{-5}$	$2{\cdot}54\times10^{-5}$	$2{\cdot}54\times10^{-2}$	$2{\cdot}77778\times10^{-2}$	$8{\cdot}33333\times10^{-2}$	*1*	2·54
$5{\cdot}390\times10^{-6}$	$6{\cdot}21372\times10^{-6}$	$1{\cdot}0\times10^{-5}$	$1{\cdot}0\times10^{-2}$	$1{\cdot}09361\times10^{-2}$	$3{\cdot}28084\times10^{-2}$	$3{\cdot}93701\times10^{-1}$	*1*

* This is the customary British practice, and not the 'international nautical mile,' which Great Britain has not adopted.

Table 2. *Area*

Square mile	Square kilometre	Hectare	Acre	Square metre	Square yard
1	2·58998	258·998	640	$258{,}998\times10$	$30{,}976\times10^{2}$
$3{\cdot}86103\times10^{-1}$	*1*	100	247·106	1,000,000	$119{,}599\times10$
$3{\cdot}86103\times10^{-3}$	$1{\cdot}0\times10^{-2}$	*1*	2·47106	10,000	11,959·9
$1{\cdot}5625\times10^{-3}$	$4{\cdot}04685\times10^{-3}$	$4{\cdot}04685\times10^{-1}$	*1*	4046·85	4840
$3{\cdot}86103\times10^{-7}$	$1{\cdot}0\times10^{-6}$	$1{\cdot}0\times10^{-4}$	$2{\cdot}47106\times10^{-4}$	*1*	1·19599
$3{\cdot}22831\times10^{-7}$	$8{\cdot}36126\times10^{-7}$	$8{\cdot}36126\times10^{-5}$	$2{\cdot}06612\times10^{-4}$	$8{\cdot}36126\times10^{-1}$	*1*

Table 3. *Yield per Unit Area*

Tons per acre	Metric tons per hectare	Quintals per hectare
1	2·51071	25·1071
$3{\cdot}98294\times10^{-1}$	*1*	10
$3{\cdot}98294\times10^{-2}$	$1{\cdot}0\times10^{-1}$	*1*

Table 4. *Volume and Capacity*

Kilolitre	Cubic metre	Cubic yard	Bushel	Cubic feet	Imp. gall.	Litre	Pint
1	1·000027	1·30799	27·4969	35·3157	219·976	1000	1759·80
$9{\cdot}99973\times10^{-1}$	*1*	1·30795	27·4962	35·3148	219·970	999·973	1759·75
$7{\cdot}64532\times10^{-1}$	$7{\cdot}64553\times10^{-1}$	*1*	21·0223	27	168·178	764·532	1345·43
$3{\cdot}63677\times10^{-2}$	$3{\cdot}63687\times10^{-2}$	$4{\cdot}75685\times10^{-2}$	*1*	1·28435	8	36·3677	64
$2{\cdot}83160\times10^{-2}$	$2{\cdot}83167\times10^{-2}$	$3{\cdot}70370\times10^{-2}$	$7{\cdot}78602\times10^{-1}$	*1*	6·22882	28·3160	49·8306
$4{\cdot}54596\times10^{-3}$	$4{\cdot}54608\times10^{-3}$	$5{\cdot}94607\times10^{-3}$	$1{\cdot}25\times10^{-1}$	$1{\cdot}60544\times10^{-1}$	*1*	4·54596	8
$1{\cdot}0\times10^{-3}$	$1{\cdot}000027\times10^{-3}$	$1{\cdot}30799\times10^{-3}$	$2{\cdot}74969\times10^{-2}$	$3{\cdot}53157\times10^{-2}$	$2{\cdot}19976\times10^{-1}$	*1*	1·75980
$5{\cdot}68245\times10^{-4}$	$5{\cdot}68260\times10^{-4}$	$7{\cdot}43258\times10^{-4}$	$1{\cdot}5625\times10^{-2}$	$2{\cdot}00680\times10^{-2}$	$1{\cdot}25\times10^{-1}$	$5{\cdot}68245\times10^{-1}$	*1*

Table 5. *Weight*

Ton	Metric ton or Millier	Quintal	Kilogram	lb.
1	1·01605	10·1605	1016·05	2240
$9{\cdot}84207\times10^{-1}$	*1*	10	1000	2204·62
$9{\cdot}84207\times10^{-2}$	$1{\cdot}0\times10^{-1}$	*1*	100	220·462
$9{\cdot}84207\times10^{-4}$	$1{\cdot}0\times10^{-3}$	$1{\cdot}0\times10^{-2}$	*1*	2·20462
$4{\cdot}46429\times10^{-4}$	$4{\cdot}53592\times10^{-4}$	$4{\cdot}53592\times10^{-3}$	$4{\cdot}53592\times10^{-1}$	*1*

Table 6. *Centimetres to Inches*

1 cm.=0·393701 in.

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	0·394	0·787	1·181	1·575	1·969	2·362	2·756	3·150	3·543
1	3·937	4·331	4·724	5·118	5·512	5·906	6·299	6·693	7·087	7·480
2	7·874	8·268	8·661	9·055	9·449	9·843	10·236	10·630	11·024	11·417
3	11·811	12·205	12·598	12·992	13·386	13·780	14·173	14·567	14·961	15·354
4	15·748	16·142	16·535	16·929	17·323	17·717	18·110	18·504	18·898	19·291
5	19·685	20·079	20·472	20·866	21·260	21·654	22·047	22·441	22·835	23·228
6	23·622	24·016	24·409	24·803	25·197	25·591	25·984	26·378	26·772	27·165
7	27·559	27·953	28·346	28·740	29·134	29·528	29·921	30·315	30·709	31·102
8	31·496	31·890	32·283	32·677	33·071	33·465	33·858	34·252	34·646	35·039
9	35·433	35·827	36·220	36·614	37·008	37·402	37·795	38·189	38·583	38·976
10	39·370									

Table 7. *Metres to Feet*

1 m.=3·28084 ft.

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	3·3	6·6	9·8	13·1	16·4	19·7	23·0	26·3	29·5
1	32·8	36·1	39·4	42·7	45·9	49·2	52·5	55·8	59·1	62·3
2	65·6	68·9	72·2	75·5	78·7	82·0	85·3	88·6	91·9	95·1
3	98·4	101·7	105·0	108·3	111·6	114·8	118·1	121·4	124·7	128·0
4	131·2	134·5	137·8	141·1	144·4	147·6	150·9	154·2	157·5	160·8
5	164·0	167·3	170·6	173·9	177·2	180·5	183·7	187·0	190·3	193·6
6	196·9	200·1	203·4	206·7	210·0	213·3	216·5	219·8	223·1	226·4
7	229·7	232·9	236·2	239·5	242·8	246·1	249·3	252·6	255·9	259·2
8	262·5	265·8	269·0	272·3	275·6	278·9	282·2	285·4	288·7	292·0
9	295·3	298·6	301·8	305·1	308·4	311·7	315·0	318·2	321·5	324·8
10	328·1	331·4	334·6	337·9	341·2	344·5	347·8	351·0	354·3	357·6

Table 7 (*continued*). *Metres to Feet*

	0	1	2	3	4	5	6	7	8	9
11	360·9	364·2	357·5	370·7	374·0	377·3	380·6	383·9	387·1	390·4
12	393·7	397·0	400·3	403·5	406·8	410·1	413·4	416·7	419·9	423·2
13	426·5	429·8	433·1	436·4	439·6	442·9	446·2	449·5	452·8	456·0
14	459·3	462·6	465·9	469·2	472·4	475·7	479·0	482·3	485·6	488·8
15	492·1	495·4	498·7	502·0	505·2	508·5	511·8	515·1	518·4	521·7
16	524·9	528·2	531·5	534·8	538·1	541·3	544·6	547·9	551·2	554·5
17	557·7	561·0	564·3	567·6	570·9	574·1	577·4	580·7	584·0	587·3
18	590·6	593·8	597·1	600·4	603·7	607·0	610·2	613·5	616·8	620·1
19	623·4	626·6	629·9	633·2	636·5	639·8	643·0	646·3	649·6	652·9
20	656·2	659·4	662·7	666·0	669·3	672·6	675·9	679·1	682·4	685·7
21	689·0	692·3	695·5	698·8	702·1	705·4	708·7	711·9	715·2	718·5
22	721·8	725·1	728·3	731·6	734·9	738·2	741·5	744·8	748·0	751·3
23	754·6	757·9	761·2	764·4	767·7	771·0	774·3	777·6	780·8	784·1
24	787·4	790·7	794·0	797·2	800·5	803·8	807·1	810·4	813·7	816·9
25	820·2	823·5	826·8	830·1	833·3	836·6	839·9	843·2	846·5	849·7
26	853·0	856·3	859·6	862·9	866·1	869·4	872·7	876·0	879·3	882·5
27	885·8	889·1	892·4	895·7	899·0	902·2	905·5	908·8	912·1	915·4
28	918·6	921·9	925·2	928·5	931·8	935·0	938·3	941·6	944·9	948·2
29	951·4	954·7	958·0	961·3	964·6	967·8	971·1	974·4	977·7	981·0
30	984·3	987·5	990·8	994·1	997·4	1000·7	1003·9	1007·2	1010·5	1013·8
31	1017·1	1020·3	1023·6	1026·9	1030·2	1033·5	1036·7	1040·0	1043·3	1046·6
32	1049·9	1053·1	1056·4	1059·7	1063·0	1066·3	1069·6	1072·8	1076·1	1079·4
33	1082·7	1086·0	1089·2	1092·5	1095·8	1099·1	1102·4	1105·6	1108·9	1112·2
34	1115·5	1118·8	1122·0	1125·3	1128·6	1131·9	1135·2	1138·5	1141·7	1145·0
35	1148·3	1151·6	1154·9	1158·1	1161·4	1164·7	1168·0	1171·3	1174·5	1177·8
36	1181·1	1184·4	1187·7	1190·9	1194·2	1197·5	1200·8	1204·1	1207·3	1210·6
37	1213·9	1217·2	1220·5	1223·8	1227·0	1230·3	1233·6	1236·9	1240·2	1243·4
38	1246·7	1250·0	1253·3	1256·6	1259·8	1263·1	1266·4	1269·7	1273·0	1276·2
39	1279·5	1282·8	1286·1	1289·4	1292·7	1295·9	1299·2	1302·5	1305·8	1309·1
40	1312·3	1315·6	1318·9	1322·2	1325·5	1328·7	1332·0	1335·3	1338·6	1341·9

Table 7 (*continued*). *Metres to Feet*

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
41	1345·1	1348·4	1351·7	1355·0	1358·3	1361·5	1364·8	1368·1	1371·4	1374·7
42	1378·0	1381·2	1384·5	1387·8	1391·1	1394·4	1397·6	1400·9	1404·2	1407·5
43	1410·8	1414·0	1417·3	1420·6	1423·9	1427·2	1430·4	1433·7	1437·0	1440·3
44	1443·6	1446·9	1450·1	1453·4	1456·7	1460·0	1463·3	1466·5	1469·8	1473·1
45	1476·4	1479·7	1482·9	1486·2	1489·5	1492·8	1496·1	1499·3	1502·6	1505·9
46	1509·2	1512·5	1515·7	1519·0	1522·3	1525·6	1528·9	1532·2	1535·4	1538·7
47	1542·0	1545·3	1548·6	1551·8	1555·1	1558·4	1561·7	1565·0	1568·2	1571·5
48	1574·8	1578·1	1581·4	1584·6	1587·9	1591·2	1594·5	1597·8	1601·0	1604·3
49	1607·6	1610·9	1614·2	1617·5	1620·7	1624·0	1627·3	1630·6	1633·9	1637·1
50	1640·4	1643·7	1647·0	1650·3	1653·6	1656·8	1660·1	1663·4	1666·7	1669·9
51	1673·2	1676·5	1679·8	1683·1	1686·4	1689·6	1692·9	1696·2	1699·5	1702·8
52	1706·0	1709·3	1712·6	1715·9	1719·2	1722·4	1725·7	1729·0	1732·3	1735·6
53	1738·8	1742·1	1745·4	1748·7	1752·0	1755·2	1758·5	1761·8	1765·1	1768·4
54	1771·7	1774·9	1778·2	1781·5	1784·8	1788·1	1791·3	1794·6	1797·9	1801·2
55	1804·5	1807·8	1811·0	1814·3	1817·6	1820·9	1824·1	1827·4	1830·7	1834·0
56	1837·3	1840·6	1843·8	1847·1	1850·4	1853·7	1857·0	1860·2	1863·5	1866·8
57	1870·1	1873·4	1876·6	1879·9	1883·2	1886·5	1889·8	1893·0	1896·3	1899·6
58	1902·9	1906·2	1909·4	1912·7	1916·0	1919·3	1922·6	1925·9	1929·1	1932·4
59	1935·7	1939·0	1942·3	1945·5	1948·8	1952·1	1955·4	1958·7	1961·9	1965·2
60	1968·5	1971·8	1975·1	1978·3	1981·6	1984·9	1988·2	1991·5	1994·8	1998·0
61	2001·3	2004·6	2007·9	2011·1	2014·4	2017·7	2021·0	2024·3	2027·6	2030·8
62	2034·1	2037·4	2040·7	2044·0	2047·2	2050·5	2053·8	2057·1	2060·4	2063·6
63	2066·9	2070·2	2073·5	2076·8	2080·1	2083·3	2086·6	2089·9	2093·2	2096·5
64	2099·7	2103·0	2106·3	2109·6	2112·9	2116·1	2119·4	2122·7	2126·0	2129·3
65	2132·5	2135·8	2139·1	2142·4	2145·7	2149·0	2152·3	2155·5	2158·8	2162·1
66	2165·4	2168·6	2171·9	2175·2	2178·5	2181·8	2185·1	2188·3	2191·6	2194·9
67	2198·2	2201·5	2204·7	2208·0	2211·3	2214·6	2217·9	2221·1	2224·4	2227·7
68	2231·0	2234·3	2237·5	2240·8	2244·1	2247·4	2250·7	2253·9	2257·2	2260·5
69	2263·8	2267·1	2270·4	2273·6	2276·9	2280·2	2283·5	2286·8	2290·0	2293·3
70	2296·6	2299·9	2303·2	2306·4	2309·7	2313·0	2316·3	2319·6	2322·8	2326·1

Table 7 (*continued*). *Metres to Feet*

	0	1	2	3	4	5	6	7	8	9
71	2329·4	2332·7	2336·0	2339·2	2342·5	2345·8	2349·1	2352·4	2355·6	2358·9
72	2362·2	2365·5	2368·8	2372·0	2375·3	2378·6	2381·9	2385·2	2388·5	2391·7
73	2395·0	2398·3	2401·6	2404·9	2408·1	2411·4	2414·7	2418·0	2421·3	2424·5
74	2427·8	2431·1	2434·4	2437·7	2440·9	2444·2	2447·5	2450·8	2454·1	2457·3
75	2460·6	2463·9	2467·2	2470·5	2473·8	2477·0	2480·3	2483·6	2486·9	2490·2
76	2493·4	2496·7	2500·0	2503·3	2506·6	2509·8	2513·1	2516·4	2519·7	2523·0
77	2526·2	2529·5	2532·8	2536·1	2539·4	2542·7	2545·9	2549·2	2552·5	2555·8
78	2559·1	2562·3	2565·6	2568·9	2572·2	2575·5	2578·7	2582·0	2585·3	2588·6
79	2591·9	2595·1	2598·4	2601·7	2605·0	2608·3	2611·5	2614·8	2618·1	2621·4
80	2624·7	2628·0	2631·2	2634·5	2637·8	2641·1	2644·4	2647·6	2650·9	2654·2
81	2657·5	2660·8	2664·0	2667·3	2670·6	2673·9	2677·2	2680·4	2683·7	2687·0
82	2690·3	2693·6	2696·9	2700·1	2703·4	2706·7	2710·0	2713·3	2716·5	2719·8
83	2723·1	2726·4	2729·7	2732·9	2736·2	2739·5	2742·8	2746·1	2749·3	2752·6
84	2755·9	2759·2	2762·5	2765·7	2769·0	2772·3	2775·6	2778·9	2782·2	2785·4
85	2788·7	2792·0	2795·3	2798·6	2801·8	2805·1	2808·4	2811·7	2815·0	2818·2
86	2821·5	2824·8	2828·1	2831·4	2834·6	2837·9	2841·2	2844·5	2847·8	2851·0
87	2854·3	2857·6	2860·9	2864·2	2867·5	2870·7	2874·0	2877·3	2880·6	2883·9
88	2887·1	2890·4	2893·7	2897·0	2900·3	2903·5	2906·8	2910·1	2913·4	2916·7
89	2919·9	2923·2	2926·5	2929·8	2933·1	2936·4	2939·6	2942·9	2946·2	2949·5
90	2952·8	2956·0	2959·3	2962·6	2965·9	2969·2	2972·4	2975·7	2979·0	2982·3
91	2985·6	2988·8	2992·1	2995·4	2998·7	3002·0	3005·2	3008·5	3011·8	3015·1
92	3018·4	3021·7	3024·9	3028·2	3031·5	3034·8	3038·1	3041·3	3044·6	3047·9
93	3051·2	3054·5	3057·7	3061·0	3064·3	3067·6	3070·9	3074·1	3077·4	3080·7
94	3084·0	3087·3	3090·6	3093·8	3097·1	3100·4	3103·7	3107·0	3110·2	3113·5
95	3116·8	3120·1	3123·4	3126·6	3129·9	3133·2	3136·5	3139·8	3143·0	3146·3
96	3149·6	3152·9	3156·2	3159·4	3162·7	3166·0	3169·3	3172·6	3175·9	3179·1
97	3182·4	3185·7	3189·0	3192·3	3195·5	3198·8	3202·1	3205·4	3208·7	3211·9
98	3215·2	3218·5	3221·8	3225·1	3228·3	3231·6	3234·9	3238·2	3241·5	3244·8
99	3248·0	3251·3	3254·6	3257·9	3261·2	3264·4	3267·7	3271·0	3274·3	3277·6
100	3280·8									

Table 8. *Kilometres to British Statute Miles*

1 km. = 0 621372 mile

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	0·621	1·243	1·864	2·485	3·107	3·728	4·350	4·971	5·592
1	6·214	6·835	7·456	8·078	8·699	9·321	9·942	10·563	11·185	11·806
2	12·427	13·049	13·670	14·292	14·913	15·534	16·156	16·777	17·398	18·020
3	18·641	19·263	19·884	20·505	21·127	21·748	22·369	22·991	23·612	24·234
4	24·855	25·476	26·098	26·719	27·340	27·962	28·583	29·204	29·826	30·447
5	31·069	31·690	32·311	32·933	33·554	34·175	34·797	35·418	36·040	36·661
6	37·282	37·904	38·525	39·146	39·768	40·389	41·011	41·632	42·253	42·875
7	43·496	44·117	44·739	45·360	45·982	46·603	47·224	47·846	48·467	49·088
8	49·710	50·331	50·952	51·574	52·195	52·817	53·438	54·059	54·681	55·302
9	55·923	56·545	57·166	57·788	58·409	59·030	59·652	60·273	60·894	61·516
10	62·137									

Table 9. *Kilometres to British Nautical Miles*

1 km. = 0·5396 nautical mile

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	0·54	1·08	1·62	2·16	2·70	3·24	3·78	4·32	4·86
1	5·40	5·94	6·48	7·01	7·55	8·09	8·63	9·17	9·71	10·25
2	10·79	11·33	11·87	12·41	12·95	13·49	14·03	14·57	15·11	15·65
3	16·19	16·73	17·27	17·81	18·35	18·89	19·43	19·97	20·50	21·04
4	21·58	22·12	22·66	23·20	23·74	24·28	24·82	25·36	25·90	26·44
5	26·98	27·52	28·06	28·60	29·14	29·68	30·22	30·76	31·30	31·84
6	32·38	32·92	33·46	33·99	34·53	35·07	35·61	36·15	36·69	37·23
7	37·77	38·31	38·85	39·39	39·93	40·47	41·01	41·55	42·09	42·63
8	43·17	43·71	44·25	44·79	45·33	45·87	46·41	46·95	47·48	48·02
9	48·56	49·10	49·64	50·18	50·72	51·26	51·80	52·34	52·88	53·42
10	53·96									

Table 10. *Square Metres to Square Feet*

1 sq. m. = 10·763911 sq. ft.

	0	1	2	3	4	5	6	7	8	9
—	—	10·764	21·528	32·292	43·056	53·820	64·583	75·347	86·111	96·875
1	107·639	118·403	129·167	139·931	150·695	161·459	172·222	182·986	193·750	204·514
2	215·278	226·042	236·806	247·570	258·334	269·098	279·861	290·625	301·389	312·153
3	322·917	333·681	344·445	355·209	365·973	376·737	387·501	398·265	409·029	419·792
4	430·556	441·320	452·084	462·848	473·612	484·376	495·140	505·904	516·668	527·432
5	538·196	548·959	559·723	570·487	581·251	592·015	602·779	613·543	624·307	635·071
6	645·835	656·599	667·363	678·126	688·890	699·654	710·418	721·182	731·946	742·710
7	753·474	764·238	775·002	785·765	796·529	807·293	818·057	828·821	839·585	850·349
8	861·113	871·877	882·641	893·405	904·169	914·932	925·696	936·460	947·224	957·988
9	968·752	979·516	990·280	1001·044	1011·808	1022·572	1033·335	1044·099	1054·863	1065·627
10	1076·3911									

Table 11. *Hectares to Acres*

1 ha. = 2·47106 acres

	0	1	2	3	4	5	6	7	8	9
—	—	2·47	4·94	7·41	9·88	12·36	14·83	17·30	19·77	22·24
1	24·71	27·18	29·65	32·12	34·59	37·07	39·54	42·01	44·48	46·95
2	49·42	51·89	54·36	56·83	59·31	61·78	64·25	66·72	69·19	71·66
3	74·13	76·60	79·07	81·54	84·02	86·49	88·96	91·43	93·90	96·37
4	98·84	101·31	103·78	106·26	108·73	111·20	113·67	116·14	118·61	121·08
5	123·55	126·02	128·50	130·97	133·44	135·91	138·38	140·85	143·32	145·79
6	148·26	150·73	153·21	155·68	158·15	160·62	163·09	165·56	168·03	170·50
7	172·97	175·45	177·92	180·39	182·86	185·33	187·80	190·27	192·74	195·21
8	197·68	200·16	202·63	205·10	207·57	210·04	212·51	214·98	217·45	219·92
9	222·40	224·87	227·34	229·81	232·28	234·75	237·22	239·69	242·16	244·63
10	247·11									

Table 12. *Square Kilometres to Square Miles*

1 sq. km. = 0·386103 sq. mile

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	0·386	0·772	1·158	1·544	1·931	2·317	2·703	3·089	3·475
1	3·861	4·247	4·633	5·019	5·405	5·792	6·178	6·564	6·950	7·336
2	7·722	8·108	8·494	8·880	9·266	9·653	10·039	10·425	10·811	11·197
3	11·583	11·969	12·355	12·741	13·128	13·514	13·900	14·286	14·672	15·058
4	15·444	15·830	16·216	16·602	16·989	17·375	17·761	18·147	18·533	18·919
5	19·305	19·691	20·077	20·463	20·850	21·236	21·622	22·008	22·394	22·780
6	23·166	23·552	23·938	24·324	24·711	25·097	25·483	25·869	26·255	26·641
7	27·027	27·413	27·799	28·186	28·572	28·958	29·344	29·730	30·116	30·502
8	30·888	31·274	31·660	32·047	32·433	32·819	33·205	33·591	33·977	34·363
9	34·749	35·135	35·521	35·908	36·294	36·680	37·066	37·452	37·838	38·224
10	38·610									

Table 13. *Numbers per Square Kilometre to Numbers per Square Mile*

(*or* square miles to square kilometres)

1 sq. mile = 2·58998 sq. km.

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	2·59	5·18	7·77	10·36	12·95	15·54	18·13	20·72	23·31
1	25·90	28·49	31·08	33·67	36·26	38·85	41·44	44·03	46·62	49·21
2	51·80	54·39	56·98	59·57	62·16	64·75	67·34	69·93	72·52	75·11
3	77·70	80·29	82·88	85·47	88·06	90·65	93·24	95·83	98·42	101·01
4	103·60	106·19	108·78	111·37	113·96	116·55	119·14	121·73	124·32	126·91
5	129·50	132·09	134·68	137·27	139·86	142·45	145·04	147·63	150·22	152·81
6	155·40	157·99	160·58	163·17	165·76	168·35	170·94	173·53	176·12	178·71
7	181·30	183·89	186·48	189·07	191·66	194·25	196·84	199·43	202·02	204·61
8	207·20	209·79	212·38	214·97	217·56	220·15	222·74	225·33	227·92	230·51
9	233·10	235·69	238·28	240·87	243·46	246·05	248·64	251·23	253·82	256·41
10	259·00									

Table 14. *Quintals per Hectare to Tons per Acre*

1 quintal per hectare = 0·0398294 ton per acre

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	0·03983	0·07966	0·11949	0·15932	0·19915	0·23898	0·27881	0·31864	0·35846
1	0·39829	0·43812	0·47795	0·51778	0·55761	0·59744	0·63727	0·67710	0·71693	0·75676
2	0·79659	0·83642	0·87625	0·91608	0·95591	0·99574	1·03556	1·07539	1·11522	1·15505
3	1·19488	1·23471	1·27454	1·31437	1·35420	1·39401	1·43386	1·47369	1·51352	1·55335
4	1·59318	1·63305	1·67283	1·71266	1·75249	1·79232	1·83215	1·87198	1·91181	1·95164
5	1·99147	2·03130	2·07113	2·11096	2·15079	2·19062	2·23045	2·27028	2·31011	2·34993
6	2·38976	2·42959	2·46942	2·50925	2·54908	2·58891	2·62874	2·66857	2·70840	2·74823
7	2·78806	2·82789	2·86772	2·90755	2·94738	2·98721	3·02703	3·06686	3·10669	3·14652
8	3·18635	3·22618	3·26601	3·30584	3·34567	3·38550	3·42533	3·46516	3·50499	3·54482
9	3·58465	3·62448	3·66430	3·70413	3·74396	3·78379	3·82362	3·86345	3·90328	3·94311
10	3·98294									

Table 15. *Cubic Metres to Cubic Feet*

1 cu. m. = 35·3148 cu. ft.

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
—	—	35·315	70·630	105·944	141·260	176·574	211·889	247·204	282·518	317·833
1	353·148	388·463	423·778	459·092	494·407	529·722	565·037	600·352	635·666	670·981
2	706·296	741·611	776·926	812·240	847·555	882·870	918·185	953·500	988·814	1024·129
3	1059·444	1094·759	1130·074	1165·388	1200·703	1236·018	1271·333	1306·648	1341·962	1377·277
4	1412·592	1447·907	1483·222	1518·536	1553·851	1589·166	1624·481	1659·796	1695·110	1730·425
5	1765·740	1801·055	1836·370	1871·684	1906·999	1942·314	1977·629	2012·944	2048·258	2083·573
6	2118·888	2154·203	2189·518	2224·832	2260·147	2295·462	2330·777	2366·092	2401·406	2436·721
7	2472·036	2507·351	2542·666	2577·980	2613·295	2648·610	2683·925	2719·240	2754·554	2789·869
8	2825·184	2860·499	2895·814	2931·128	2966·443	3001·758	3037·073	3072·388	3107·702	3143·017
9	3178·332	3213·647	3248·962	3284·276	3319·591	3354·906	3390·221	3425·536	3460·850	3496·165
10	3531·480									

Table 16. *Litres to Gallons*

1 l. = 0·219976 gal.

	0	1	2	3	4	5	6	7	8	9
—	—	0·220	0·440	0·660	0·880	1·100	1·320	1·540	1·760	1·980
1	2·200	2·420	2·640	2·860	3·080	3·300	3·520	3·740	3·960	4·180
2	4·400	4·619	4·839	5·059	5·279	5·499	5·719	5·939	6·159	6·379
3	6·599	6·819	7·039	7·259	7·479	7·699	7·919	8·139	8·359	8·579
4	8·799	9·019	9·239	9·459	9·679	9·899	10·119	10·339	10·559	10·779
5	10·999	11·219	11·439	11·659	11·879	12·099	12·319	12·539	12·759	12·979
6	13·199	13·419	13·639	13·858	14·078	14·298	14·518	14·738	14·958	15·178
7	15·398	15·618	15·838	16·058	16·278	16·498	16·718	16·938	17·158	17·378
8	17·598	17·818	18·038	18·258	18·478	18·698	18·918	19·138	19·358	19·578
9	19·798	20·018	20·238	20·458	20·678	20·898	21·118	21·338	21·558	21·778
10	21·998									

Table 17. *Kilogrammes to Pounds*

1 kg. = 2·20462 lb.

	0	1	2	3	4	5	6	7	8	9
—	—	2·205	4·409	6 614	8·818	11·023	13·228	15·432	17·637	19·842
1	22·046	24·251	26·455	28·660	30·865	33·069	35·274	37·478	39·683	41·888
2	44·092	46·297	48·502	50·706	52·911	55·115	57·320	59·525	61·729	63·934
3	66·139	68·343	70·548	72·752	74·957	77·162	79·366	81·571	83·776	85·980
4	88·185	90·389	92·594	94·799	97·003	99·208	101·413	103·617	105·822	108·026
5	110·231	112·436	114·640	116·845	119·049	121·254	123·459	125·663	127·868	130·073
6	132·277	134·482	136·686	138·891	141·096	143·300	145·505	147·710	149·914	152·119
7	154·323	156·528	158·733	160·937	163·142	165·346	167·551	169·756	171·960	174·165
8	176·370	178·574	180·779	182·983	185·188	187·393	189·597	191·802	194·007	196·211
9	198·416	200·620	202·825	205·030	207·234	209·439	211·644	213·848	216·053	218·257
10	220·462									

Table 18. *Temperature: Equivalents of Fahrenheit and Centigrade Scales*

°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.
212	100	192	88·8	172·4	78	153	67·2	133·25	56·25	114	45·5
211	99·4	191·75	88·75	172	77·7	152·6	67	133	56·1	113	45
210·2	99	191	88·3	171·5	77·5	152	66·6	132·8	56	112	44·4
210	98·8	190·4	88	171	77·2	151·25	66·25	132	55·5	111·2	44
209·75	98·75	190	87·7	170·6	77	151	66·1	131	55	111	43·8
209	98·3	189·5	87·5	170	76·6	150·8	66	130	54·4	110·75	43·75
208·4	98	189	87·2	169·25	76·25	150	65·5	129·2	54	110	43·3
208	97·7	188·6	87	169	76·1	149	65	129	53·8	109·4	43
207·5	97·5	188	86·6	168·8	76	148	64·4	128·75	53·75	109	42·7
207	97·2	187·25	86·25	168	75·5	147·2	64	128	53·3	108·5	42·5
206·6	97	187	86·1	167	75	147	63·8	127·4	53	108	42·2
206	96·6	186·8	86	166	74·4	146·75	63·75	127	52·7	107·6	42
205·25	96·25	186	85·5	165·2	74	146	63·3	126·5	52·5	107	41·6
205	96·1	185	85	165	73·8	145·4	63	126	52·2	106·25	41·25
204·8	96	184	84·4	164·75	73·75	145	62·7	125·6	52	106	41·1
204	95·5	183·2	84	164	73·3	144·5	62·5	125	51·6	105·8	41
203	95	183	83·8	163·4	73	144	62·2	124·25	51·25	105	40·5
202	94·4	182·75	83·75	163	72·7	143·6	62	124	51·1	104	40
201·2	94	182	83·3	162·5	72·5	143	61·6	123·8	51	103	39·4
201	93·8	181·4	83	162	72·2	142·25	61·25	123	50·5	102·2	39
200·75	93·75	181	82·7	161·6	72	142	61·1	122	50	102	38·8
200	93·3	180·5	82·5	161	71·6	141·8	61	121	49·4	101·75	38·75
199·4	93	180	82·2	160·25	71·25	141	60·5	120·2	49	101	38·3
199	92·7	179·6	82	160	71·1	140	60	120	48·8	100·4	38
198·5	92·5	179	81·6	159·8	71	139	59·4	119·75	48·75	100	37·7
198	92·2	178·25	81·25	159	70·5	138·2	59	119	48·3	99·5	37·5
197·6	92	178	81·1	158	70	138	58·8	118·4	48	99	37·2
197	91·6	177·8	81	157	69·4	137·75	58·75	118	47·7	98·6	37
196·25	91·25	177	80·5	156·2	69	137	58·3	117·5	47·5	98	36·6
196	91·1	176	80	156	68·8	136·4	58	117	47·2	97·25	36·25
195·8	91	175	79·4	155·75	68·75	136	57·7	116·6	47	97	36·1
195	90·5	174·2	79	155	68·3	135·5	57·5	116	46·6	96·8	36
194	90	174	78·8	154·4	68	135	57·2	115·25	46·25	96	35·5
193	89·4	173·75	78·75	154	67·7	134·6	57	115	46·1	95	35
192·2	89	173	78·3	153·5	67·5	134	56·6	114·8	46	94	34·4

Table 18 (*continued*). *Temperature: Equivalents of Fahrenheit and Centigrade Scales*

°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.	°F.	°C.
93·2	34	73	22·7	52·25	11·25	31	− 0·5	10·4	−12	−10	−23·3
93	33·8	72·5	22·5	52	11·1	30·2	− 1	10	−12·2	−10·75	−23·75
92·75	33·75	72	22·2	51·8	11	30	− 1·1	9·5	−12·5	−11	−23·8
92	33·3	71·6	22	51	10·5	29·75	− 1·25	9	−12·7	−11·2	−24
91·4	33	71	21·6	50	10	29	− 1·6	8·6	−13	−12	−24·4
91	32·7	70·25	21·25	49	9·4	28·4	− 2	8	−13·3	−13	−25
90·5	32·5	70	21·1	48·2	9	28	− 2·2	7·25	−13·75	−14	−25·5
90	32·2	69·8	21	48	8·8	27·5	− 2·5	7	−13·8	−14·8	−26
89·6	32	69	20·5	47·75	8·75	27	− 2·7	6·8	−14	−15	−26·1
89	31·6	68	20	47	8·3	26·6	− 3	6	−14·4	−15·25	−26·25
88·25	31·25	67	19·4	46·4	8	26	− 3·3	5	−15	−16	−26·6
88	31·1	66·2	19	46	7·7	25·25	− 3·75	4	−15·5	−16·6	−27
87·8	31	66	18·8	45·5	7·5	25	− 3·8	3·2	−16	−17	−27·2
87	30·5	65·75	18·75	45	7·2	24·8	− 4	3	−16·1	−17·5	−27·5
86	30	65	18·3	44·6	7	24	− 4·4	2·75	−16·25	−18	−27·7
85	29·4	64·4	18	44	6·6	23	− 5	2	−16·6	−18·4	−28
84·2	29	64	17·7	43·25	6·25	22	− 5·5	1·4	−17	−19	−28·3
84	28·8	63·5	17·5	43	6·1	21·2	− 6	1	−17·2	−19·75	−28·75
83·75	28·75	63	17·2	42·8	6	21	− 6·1	0·5	−17·5	−20	−28·8
83	28·3	62·6	17	42	5·5	20·75	− 6·25	0	−17·7	−20·2	−29
82·4	28	62	16·6	41	5	20	− 6·6	− 0·4	−18	−21	−29·4
82	27·7	61·25	16·25	40	4·4	19·4	− 7	− 1	−18·3	−22	−30
81·5	27·5	61	16·1	39·2	4	19	− 7·2	− 1·75	−18·75	−23	−30·5
81	27·2	60·8	16	39	3·8	18·5	− 7·5	− 2	−18·8	−23·8	−31
80·6	27	60	15·5	38·75	3·75	18	− 7·7	− 2·2	−19	−24	−31·1
80	26·6	59	15	38	3·3	17·6	− 8	− 3	−19·4	−24·25	−31·25
79·25	26·25	58	14·4	37·4	3	17	− 8·3	− 4	−20	−25	−31·6
79	26·1	57·2	14	37	2·7	16·25	− 8·75	− 5	−20·5	−25·6	−32
78·8	26	57	13·8	36·5	2·5	16	− 8·8	− 5·8	−21	−26	−32·2
78	25·5	56·75	13·75	36	2·2	15·8	− 9	− 6	−21·1	−26·5	−32·5
77	25	56	13·3	35·6	2	15	− 9·4	− 6·25	−21·25	−27	−32·7
76	24·4	55·4	13	35	1·6	14	−10	− 7	−21·6	−27·4	−33
75·2	24	55	12·7	34·25	1·25	13	−10·5	− 7·6	−22	−28	−33·3
75	23·8	54·5	12·5	34	1·1	12·2	−11	− 8	−22·2	−28·75	−33·75
74·75	23·75	54	12·2	33·8	1	12	−11·1	− 8·5	−22·5	−29	−33·8
74	23·3	53·6	12	33	0·5	11·75	−11·25	− 9	−22·7	−29·2	−34
73·4	23	53	11·6	32	0	11	−11·6	− 9·4	−23	−30	−34·4

Table 19. *Pressure: Equivalents of Millibars, Millimetres of Mercury, and Inches of Mercury at 32° F. in Latitude 45°*

Mercury in.	Milli-bars	Mercury mm.	Mercury in.	Milli-bars	Mercury mm.	Mercury in.	Milli-bars	Mercury mm.	Mercury in.	Milli-bars	Mercury mm.	Mercury in.	Milli-bars	Mercury mm.
27·02	915	686·3	27·82	942	706·6	28·62	969	726·8	29·41	996	747·1	30·21	1,023	767·3
27·05	916	687·1	27·85	943	707·3	28·65	970	727·6	29·44	997	747·8	30·24	1,024	768·1
27·08	917	687·8	27·88	944	708·1	28·67	971	728·3	29·47	998	748·6	30·27	1,025	768·8
27·11	918	688·6	27·91	945	708·8	28·70	972	729·1	29·50	999	749·3	30·30	1,026	769·6
27·14	919	689·3	27·94	946	709·6	28·73	973	729·8	29·53	1,000	750·1	30·33	1,027	770·3
27·17	920	690·1	27·97	947	710·3	28·76	974	730·6	29·56	1,001	750·8	30·36	1,028	771·1
27·20	921	690·8	28·00	948	711·1	28·79	975	731·3	29·59	1,002	751·6	30·39	1,029	771·8
27·23	922	691·6	28·03	949	711·8	28·82	976	732·1	29·62	1,003	752·3	30·42	1,030	772·6
27·26	923	692·3	28·05	950	712·6	28·85	977	732·8	29·65	1,004	753·1	30·45	1,031	773·3
27·29	924	693·1	28·08	951	713·3	28·88	978	733·6	29·68	1,005	753·8	30·48	1,032	774·1
27·32	925	693·8	28·11	952	714·1	28·91	979	734·3	29·71	1,006	754·6	30·51	1,033	774·8
27·35	926	694·6	28·14	953	714·8	28·94	980	735·1	29·74	1,007	755·3	30·53	1,034	775·6
27·38	927	695·3	28·17	954	715·6	28·97	981	735·8	29·77	1,008	756·1	30·56	1,035	776·3
27·41	928	696·1	28·20	955	716·3	29·00	982	736·6	29·80	1,009	756·8	30·59	1,036	777·1
27·44	929	696·8	28·23	956	717·1	29·03	983	737·3	29·83	1,010	757·6	30·62	1,037	777·8
27·46	930	697·6	28·26	957	717·8	29·06	984	738·1	29·86	1,011	758·3	30·65	1,038	778·6
27·49	931	698·3	28·29	958	718·6	29·09	985	738·8	29·89	1,012	759·1	30·68	1,039	779·3
27·52	932	699·1	28·32	959	719·3	29·12	986	739·6	29·92	1,013	759·8	30·71	1,040	780·1
27·55	933	699·8	28·35	960	720·1	29·15	987	740·3	29·94	1,014	760·6	30·74	1,041	780·8
27·58	934	700·6	28·38	961	720·8	29·18	988	741·1	29·97	1,015	761·3	30·77	1,042	781·6
27·61	935	701·3	28·41	962	721·6	29·21	989	741·8	30·00	1,016	762·1	30·80	1,043	782·3
27·64	936	702·1	28·44	963	722·3	29·24	990	742·6	30·03	1,017	762·8	30·83	1,044	783·1
27·67	937	702·8	28·47	964	723·1	29·26	991	743·3	30·06	1,018	763·6	30·86	1,045	783·8
27·70	938	703·6	28·50	965	723·8	29·29	992	744·1	30·09	1,019	764·3	30·89	1,046	784·6
27·73	939	704·3	28·53	966	724·6	29·32	993	744·8	30·12	1,020	765·1	30·92	1,047	785·3
27·76	940	705·1	28·56	967	725·3	29·35	994	745·6	30·15	1,021	765·8	30·95	1,048	786·1
27·79	941	705·8	28·59	968	726·1	29·38	995	746·3	30·18	1,022	766·6	30·98	1,049	786·8

Table 20. *Conversion Table for Petroleum Products. Volume per unit weight and weight per unit volume of liquid**

Sp. gravity	Volume per long ton† in				Weight in long tons‡ per			
	Cu.m.§	Imp. gal.	Amer. gal.	Amer. barrels	Cu.m.	Imp. gal.	Amer. gal.	Amer. barrels
0·650	1·57	345	414	9·9	0·638	0·00290	0·00242	0·101
0·700	1·46	320	384	9·2	0·687	0·00312	0·00260	0·109
0·750	1·36	299	359	8·5	0·736	0·00335	0·00279	0·117
0·800	1·27	280	336	8·0	0·786	0·00357	0·00297	0·125
0·850	1·20	264	317	7·5	0·835	0·00379	0·00316	0·133
0·900	1·13	249	299	7·1	0·884	0·00402	0·00335	0·141
0·950	1·07	236	283	6·7	0·933	0·00424	0·00353	0·148
1·000	1·02	224	269	6·4	0·982	0·00447	0·00372	0·156

* The figures in this table are only approximate.
† To obtain volume per metric ton multiply figures in table by 0·98421.
‡ To obtain weights in metric tons multiply figures in table by 1·01605.
§ 1 cu.m. = 10 hectolitres (approximate).

The specific gravity of a product must be known in order to calculate accurately equivalent weights and volumes from the above table. The following table shows how widely the specific gravities of crude oils and commercial petroleum products may vary, and will indicate the degree of error involved in assumption of approximate specific gravity figures.

Product	Specific gravity range	Product	Specific gravity range
Crude oils	0·800–0·970	Diesel oils	0·820–0·920
Aviation gasolines	0·700–0·780	Lubricating oils	0·850–0·950
Motor gasolines	0·710–0·790	Fuel oils	0·920–0·990
Kerosines	0·780–0·840	Asphaltic bitumens	1·000–1·100
Gas oils	0·820–0·900		

Thus, if the specific gravity of a crude oil is assumed to be 0·850, a production of 10,000 long tons is equivalent to

7·5 × 10,000 = 75,000 American barrels;

whereas, if its true specific gravity is 0·950, the production is only 67,000 American barrels.

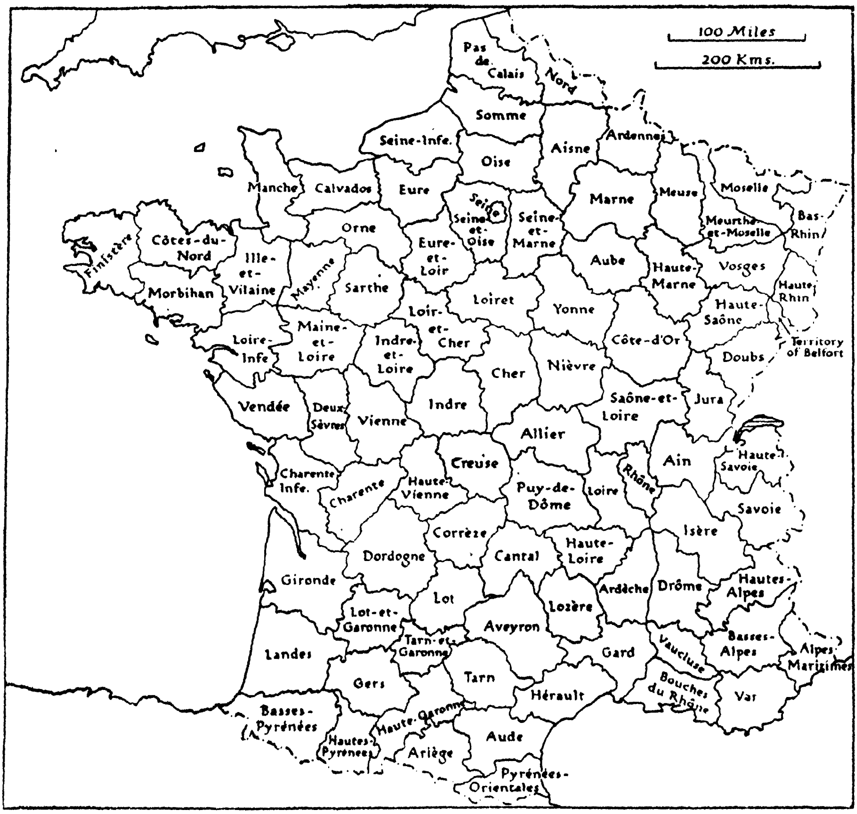

Fig. 110. The departments of France

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